2004-3

TOSHIBA

PRODUCT GUIDE

Small and Medium Diodes

2004 semiconductor

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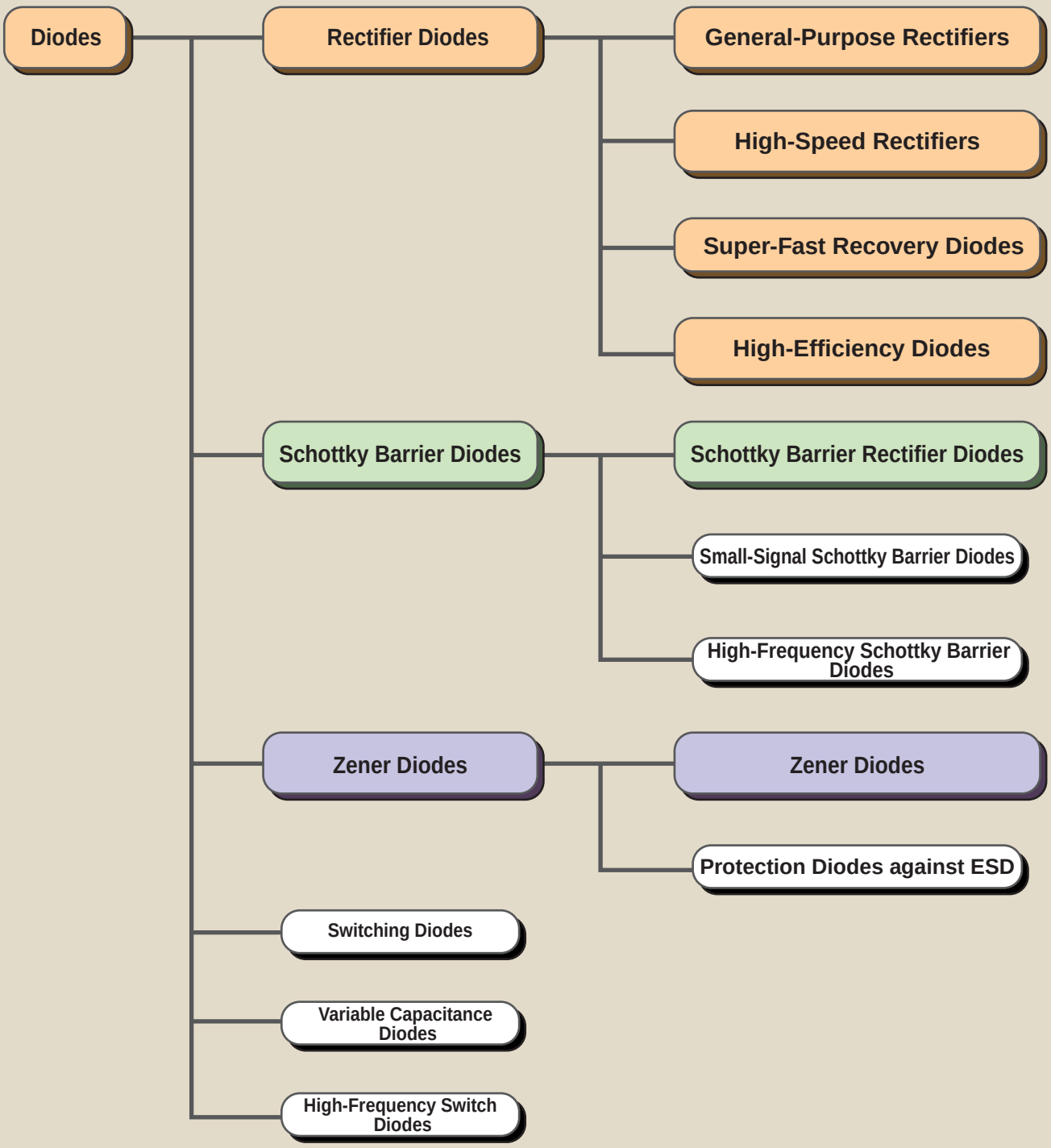
For more details about individual products' characteristics, as shown in the technical datasheets, please refer to 2002 edition of the TOSHIBA Rectifiers Databook or visit our website: **http://www.semicon.toshiba.co.jp/eng**

1. Diode Product Tree



This brochure only contains information on the small and medium rectifier diodes.
For the other information on TOSHIBA diodes, please refer to the brochures or visit our website below.

Website: http://www.semicon.toshiba.co.jp/eng

Brochures: RF Semiconductors
General-Purpose Small-Signal Surface-Mount Devices

General-Purpose Rectifiers and High-Speed Rectifiers

■ General-Purpose Rectifiers

Average Forward Current	Package	Peak Repetitive Reverse Voltage 100V	400V	600V	800V	1000V	Package Number	Page Listing
0.7 A	S-FLAT	CRG01	CRG02				⑭	10
1 A	DO-15	1S1885	1S1887	1S1888		1S1830	④	12
1 A	DO-41	S5277B	S5277G	S5277J		S5277N	③	11
1 A	DO-41S	S5566B	S5566G	S5566J		S5566N	②	11
1 A	DO-41SS	S5688B	S5688G	S5688J		S5688N	①	11
1 A	S-FLAT NEW		CRG03				⑭	10
1 A	I-FLAT	U1BC44	U1GC44 U1GC44S✻	U1JC44			⑯	10
1 A	M-FLAT NEW		CMC01✻				⑮	12
1.2 A	DO-15	1S1885A	1S1887A	1S1888A			④	12
1.5 A	DO-15L	1R5BZ41	1R5GZ41	1R5JZ41		1R5NZ41	⑤	10
2 A	M-FLAT NEW		CMG02				⑮	12
10 A	TO220-SM				U10LC48		㉑	12

✻: For strobe discharge circuit

■ Fast Recovery Diodes (FRDs)

Average Forward Current	Package	Reverse Recovery Time	Peak Repetitive Reverse Voltage 100V	400V	500V	600V	1000V	1500V	1800V	Package Number	Page Listing
0.2 A	DO-41S	4 µs					TFR3N	TFR3T		②	13
0.2 A	DO-41SS	10 µs			TFR7H✻					①	13
0.3 A	DO-41SS	4 µs					TFR4N	TFR4T		①	13
0.5 A	DO-15	1.5 µs	S5295B	S5295G		S5295J				④	14
0.5 A	DO-41SS	1.5 µs	TVR5B	TVR5G		TVR5J				①	13
0.5 A	I-FLAT	1.5 µs		U05GH44		U05JH44				⑯	13
0.5 A	I-FLAT	4 µs					U05NH44	U05TH44		⑯	13
0.5 A	DO-41	2 µs	TVR1B	TVR1G		TVR1J				③	14
0.5 A	DO-41	4 µs					TFR2N	TFR2T		③	14
0.5 A	DO-41	10 µs					TFR1N	TFR1T		③	14
0.5 A	DO-41	20 µs	TVR2B	TVR2G		TVR2J				③	14
0.7 A	DO-15	6 µs							1S1832	④	14
1 A	DO-41SS	0.4 µs					1NH42			①	13
1 A	DO-41S	0.4 µs					1NH41			②	13
1 A	DO-15	1.5 µs		1S1834		1S1835				④	14
1.2 A	DO-15L	20 µs				TVR4J	TVR4N			⑤	14
1.5 A	DO-15L	0.4 µs					1R5NH41			⑤	14

✻: V_{RM} = 500 V, V_{RRSM} = 1500 V

Very-Fast and Super-Fast Recovery Diodes (V-FRDs) (S-FRDs); High-Efficiency Diodes (HEDs)

■ Very-Fast Recovery Diodes (V-FRDs)

		Package	Reverse Recovery Time	Peak Repetitive Reverse Voltage			Package Number	Page Listing
				400 V	600 V	1000 V		
Average Forward Current	0.5 A	DO-41SS	200 ns			05NH46	①	15
		DO-41S	200 ns			05NH45	②	
	1.0 A	DO-41SS	200 ns	1GH46	1JH46		①	
		DO-41S	200 ns	1GH45	1JH45		②	
	1.5 A	DO-15L	200 ns	1R5GH45	1R5JH45	1R5NH45	⑤	

■ Super-Fast Recovery Diodes (S-FRDs)

		Package	Reverse Recovery Time	Peak Repetitive Reverse Voltage				Package Number	Page Listing
				400 V	600 V	800 V	1000 V		
Average Forward Current	0.5 A	S-FLAT NEW	100 ns			CRF02⁎		⑭	16
		I-FLAT	100 ns				U05NU44	⑯	
		DO-41SS	100 ns				05NU42	①	
		DO-41S	100 ns				05NU41	②	
	0.7 A	S-FLAT NEW	100 ns		CRF03			⑭	
	0.8 A	DO-41	100 ns	0R8GU41				③	17
	1 A	I-FLAT	100 ns	U1GU44	U1JU44			⑯	16
		DO-41SS	100 ns	1GU42	1JU42		1NU41	①	
		DO-41S	100 ns		1JU41		1R5NU41	②	
		DO-15	100 ns					④	17
	1.5 A	DO-15L	100 ns	1R5GU41	1R5JU41			⑤	
	5.0 A	TO-220NIS #	100 ns	5GUZ47	5JUZ47			⑥	

#: Center lead less ⁎: For strobe discharge circuit

■ High-Efficiency Diodes (HEDs)

			Package	Reverse Recovery Time	Peak Repetitive Reverse Voltage				Package Number	Page Listing
					200 V	300 V	400 V	600 V		
Average Forward Current	Single type	1 A	S-FLAT	35 ns	CRH01				⑭	18
			M-FLAT NEW	35 ns	CMH04		CMH05⁎ CMH05A		⑮	19
			I-FLAT	35 ns	U1DL44A				⑯	18
			PW-MINI	60 ns	U1DL49				⑱	
			DO-41S	35 ns	1DL41A				②	19
			DO-41SS	35 ns	1DL42A				①	
		1.5 A	DO-15L	35 ns	1R5DL41A				⑤	
		2 A	M-FLAT NEW	35 ns	CMH07		CMH08⁎ CMH08A		⑮	20
		3 A	M-FLAT NEW	35 ns	CMH01		CMH02⁎ CMH02A			
		5 A	TO-220NIS#	35 ns	5DLZ47A		5GLZ47A	5JLZ47⁎ 5JLZ47A	⑥	
Average Output Current	Center-tap type	5 A	TO-220AB	35 ns	5DL2C41A				⑧	21
			TO-220FL	35 ns	5DL2C48A	5FL2C48A			⑦	
			TO-220NIS	35 ns	5DL2CZ47A	5FL2CZ47A	5GL2CZ47A	5JL2CZ47⁎	⑨	
			TO-220SM	35 ns	U5DL2C48A	U5FL2C48A			㉑	
		10 A	TO-220AB	35 ns	10DL2C41A				⑧	
			TO-220FL	35 ns	10DL2C48A	10FL2C48A			⑦	
			TO-220NIS	35 ns	10DL2CZ47A	10FL2CZ47A	10GL2CZ47A	10JL2CZ47⁎ 10JL2CZ47A	⑨	
			TO-220SM	35 ns	U10DL2C48A	U10FL2C48A		U10JL2C48A	㉑	22
		16 A	TO-3P(N)	35 ns	16DL2C41A	16FL2C41A			⑩	
			TO-220NIS	35 ns	16DL2CZ47A	16FL2CZ47A			⑨	21
		20 A	TO-3P(N)	35 ns	20DL2C41A	20FL2C41A	20GL2C41A	20JL2C41⁎ 20JL2C41A	⑩	22
			TO-220FL	35 ns	20DL2C48A	20FL2C48A			⑦	21
			TO-220NIS	35 ns	20DL2CZ47A	20FL2CZ47A			⑨	
			TO-220SM	35 ns	U20DL2C48A	U20FL2C48A	U20GL2C48A	U20JL2C48A	㉑	22
			TO-3P(N)IS	35 ns	20DL2CZ51A	20FL2CZ51A			⑪	
			TFP	35 ns	U20DL2C53A		U20GL2C53A		㉒	
		30 A	TO-3P(N)	50 ns				30JL2C41	⑩	

⁎: trr ≦ 50 ns #: Center lead less

Schottky Barrier Diodes (SBDs)

			Package	Peak Repetitive Reverse Voltage					Package Number	Page Listing
				20V	30V	40V	60V	120V		
Average Forward Current	Single type	1 A	US-FLAT NEW		CUS01,CUS02	CUS03	CUS04		⑬	23
			S-FLAT	CRS06	CRS01,CRS02 CRS03,CRS05 CRS11	CRS04	CRS12		⑭	
			M-FLAT NEW		CMS08,CMS09	CMS10			⑮	
			PW-MINI			U1GWJ49			⑱	24
			DO-41S			1GWJ42			②	
			DO-41SS		1FWJ43N 1FWJ43L 1FWJ43M	1GWJ43			①	
			I-FLAT		U1FWJ44N U1FWJ44L U1FWJ44M	U1GWJ44			⑯	23
			VS-8 NEW		TPCF8E02				⑰	24
		1.5 A	S-FLAT		CRS08,CRS09				⑭	23
		2 A	M-FLAT NEW		CMS06,CMS07	CMS11	CMS14		⑮	
			DO-15L		2FWJ42N 2FWJ42M	2GWJ42 2GWJ42			⑤	25
			I-FLAT		U2FWJ44N U2FWJ44M	U2GWJ44			⑯	24
		3 A	M-FLAT NEW		CMS01,CMS02 CMS03	CMS16	CMS15		⑮	23
		5 A	M-FLAT		CMS04,CMS05				⑮	23
			TO-220NIS#			5GWJZ47			⑥	25
Average Output Current	Center-tap type	1 A	PW-MINI			U1GWJ2C49			⑲	26
		5 A	DP		U5FWK2C42				⑳	
			TO-220FL		5FWJ2C48M	5GWJ2C48C			⑦	
			TO-220NIS		5FWJ2CZ47M	5GWJ2CZ47C			⑨	27
			TO-220SM		U5FWJ2C48M	U5GWJ2C48C			㉑	
		10 A	TO-220FL		10FWJ2C48M	10GWJ2C48C			⑦	
			TO-220NIS		10FWJ2CZ47M	10GWJ2CZ47C			⑨	
			TO-220SM		U10FWJ2C48M	U10GWJ2C48C			㉑	28
		20 A	TO-220FL		20FWJ2C48M				⑦	27
			TO-220NIS		20FWJ2CZ47M				⑨	
			TO-220SM		U20FWJ2C48M				㉑	28
		30 A	TO-3P(N)			30GWJ2C42C			⑩	
			TO-220FL		30FWJ2C48M	30GWJ2C48M		30QWK2C48	⑦	27
			TO-220NIS		30FWJ2CZ47M	30GWJ2CZ47C		30QWK2CZ47	⑨	
			TO-220SM		U30FWJ2C48M	U30GWJ2C48C			㉑	28
			TFP		U30FWJ2C53M	U30GWJ2C53C		U30QWK2C53	㉒	

#: Center lead less

Zener Diodes

● Power Zener Diodes

	0.2 W NEW	0.7 W	1 W						1.5 W	2 W NEW	5 W
Note	±10%	±10%	±10%	±10%	±5%	±10%	±5%	±10%	±10%	±10%	±10%
Packege / Vz(V)	USC (SMD)	S-FLAT (SMD)	DO-41SS			DO-15		I-FLAT (SMD)	DO-15L	M-FLAT (SMD)	MR (SMD)
6.2		CRY62				1Z6.2					
6.8		CRY68	1ZB6.8			1Z6.8	1Z6.8A	U1ZB6.8			
7.5		CRY75	1ZB7.5			1Z7.5	1Z7.5A	U1ZB7.5			
8.2		CRY85	1ZB8.2			1Z8.2	1Z8.2A	U1ZB8.2			
9.1		CRY91	1ZB9.1			1Z9.1	1Z9.1A	U1ZB9.1			
10		CRZ10	1ZB10			1Z10	1Z10A	U1ZB10			
11		CRZ11	1ZB11			1Z11	1Z11A	U1ZB11			
12		CRZ12	1ZB12	1ZC12	1ZC12A	1Z12	1Z12A	U1ZB12	2Z12	CMZ12	
13		CRZ13	1ZB13	1ZC13	1ZC13A	1Z13	1Z13A	U1ZB13	2Z13	CMZ13	
15		CRZ15	1ZB15	1ZC15	1ZC15A	1Z15	1Z15A	U1ZB15	2Z15	CMZ15	
16		CRZ16	1ZB16	1ZC16	1ZC16A	1Z16	1Z16A	U1ZB16	2Z16	CMZ16	
18		CRZ18	1ZB18	1ZC18	1ZC18A	1Z18	1Z18A	U1ZB18	2Z18	CMZ18	
20		CRZ20	1ZB20	1ZC20	1ZC20A	1Z20	1Z20A	U1ZB20	2Z20	CMZ20	
22		CRZ22	1ZB22	1ZC22	1ZC22A	1Z22	1Z22A	U1ZB22	2Z22	CMZ22	
24		CRZ24	1ZB24	1ZC24	1ZC24A	1Z24	1Z24A	U1ZB24	2Z24	CMZ24	
27		CRZ27	1ZB27	1ZC27	1ZC27A	1Z27	1Z27A	U1ZB27	2Z27	CMZ27	U5ZA27(Z) U5ZA27C
30		CRZ30	1ZB30	1ZC30	1ZC30A	1Z30	1Z30A	U1ZB30	2Z30	CMZ30	
33		CRZ33	1ZB33	1ZC33	1ZC33A	1Z33		U1ZB33	2Z33	CMZ33	
36		CRZ36	1ZB36	1ZC36	1ZC36A	1Z36		U1ZB36	2Z36	CMZ36	
39		CRZ39		1ZC39	1ZC39A					CMZ39	
40											U5ZA40C
43		CRZ43	1ZB43	1ZC43	1ZC43A	1Z43		U1ZB43		CMZ43	
47		CRZ47	1ZB47	1ZC47	1ZC47A	1Z47		U1ZB47	2Z47	CMZ47	
48											U5ZA48C
51			1ZB51	1ZC51	1ZC51A	1Z51		U1ZB51	2Z51	CMZ51	
53										CMZ53	U5ZA53C
56				1ZC56	1ZC56A						
62				1ZC62	1ZC62A						
68			1ZB68	1ZC68	1ZC68A	1Z68		U1ZB68			
75			1ZB75	1ZC75	1ZC75A	1Z75		U1ZB75			
82			1ZB82	1ZC82	1ZC82A	1Z82		U1ZB82			
91				1ZC91	1ZC91A						
100			1ZB100	1ZC100	1ZC100A	1Z100		U1ZB100			
110			1ZB110	1ZC110	1ZC110A	1Z110		U1ZB110			
120				1ZC120	1ZC120A						
150			1ZB150			1Z150		U1ZB150			
180			1ZB180			1Z180		U1ZB180			
200			1ZB200					U1ZB200			
220			1ZB220					U1ZB220			
240			1ZB240					U1ZB240			
270			1ZB270					U1ZB270			
300	U02Z300N		1ZB300					U1ZB300			
330			1ZB330					U1ZB330			
390			1ZB390					U1ZB390			
Package Number	⑫	⑭	①	①	①	④	④	⑯	⑤	⑮	㉔
Page Listing	29	30	31	32	32	34	34	33	35	36	37

Note: ± and % indicate Vz tolerance

● Bi-directional Zener Diodes

Part Number	Allowable Power Dissipaion (W)	Package	VZ(V)	Package Number	Page Listing
CMZM16 NEW	1W	M-FLAT	16	⑮	36

3. Definitions and Terms

(1) General-Purpose Rectifiers

- Plastic mold type
- Various product line from I_F = 0.7 A to 10 A
- Needs meet to lead formed products
- Needs meet to tape packed products
- The material used in the manufacture of these rectifiers is 94V-0, which has been approved by the UL.

(2) High-Speed Rectifiers

SBDs (Schottky Barrier Diodes)

- Voltage Rating: V_{RRM} = 30 V, 40 V, 60 V and 120 V
- Current Rating: I_O = 1 A to 30 A
- Forward Voltage Drop:

  V_{FM} = 0.32 V typ. (0.37 V max).....V_{RRM} = 30 V
  V_{FM} = 0.34 V typ. (0.40 V max).....V_{RRM} = 30 V
  V_{FM} = 0.42 V typ. (0.45 V max).....V_{RRM} = 30 V
  V_{FM} = 0.43 V typ. (0.47 V max).....V_{RRM} = 30 V
  V_{FM} = 0.48 V typ. (0.55 V max).....V_{RRM} = 40 V
  V_{FM} = 0.52 V typ. (0.58 V max).....V_{RRM} = 60 V
  V_{FM} = 0.8 V typ. (0.85 V max).....V_{RRM} = 120 V
  All three types supports high-efficiency design of switching power supplies with low V_{FM} and low I_R.
- Current Balance: Center-tap SBDs are monolithic in structure and capable of parallel operation.

HEDs (High-Efficiency Diodes)

- Voltage Rating: V_{RRM} = 200, 300, 400 and 600 V
- Current Rating: I_O = 1 to 30 A
- High-Speed Switching: Reverse Recovery Time (trr) = 35 ns max
- Current Balance: Center-tap SBDs are monolithic in structure and capable of parallel operation

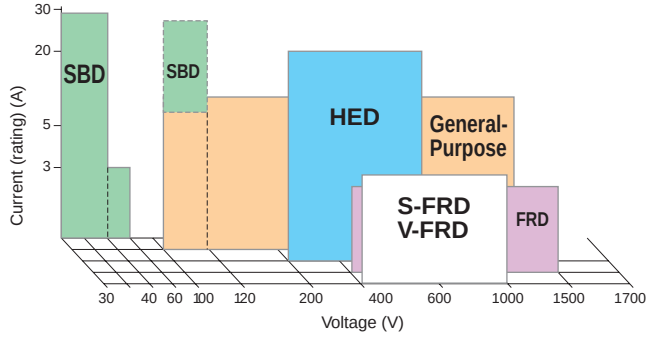
S-FRDs (Super-Fast Recovery Diodes)

- Voltage Rating: V_{RRM} = 400 V, 600 V, 800 V, 1000 V (high voltage)
- Current Rating: $I_{F(AV)}$ = 0.5 A to 5 A
- High-Speed Switching: Reverse recovery time (trr) ≤ 100 ns max

V-FRDs (Very-Fast Recovery Diodes)

- Voltage Rating: V_{RRM} = 400 V, 600 V, 1000 V (high voltage)
- Forward Voltage Drop: V_{FM} = 0.95 V typ. (1.1 V max).....V_{RRM} = 400 V
  V_{FM} = 1.05 V typ. (1.2 V max).....V_{RRM} = 600 V
  V_{FM} = 1.20 V typ. (1.5 V max).....V_{RRM} = 1000 V
  High voltage and low forward voltage drop
- High-Speed Switching: Reverse recovery time (trr) ≤ 200 ns max

(3) Various Types of Rectifiers



Characteristics (intended value)

	Forward Voltage Characteristics	Applied Frequancy
SBD	0.3 V to 0.85 V	200 kHz or more
HED	0.98 V to 4.0 V	Up to 200 kHz
S-FRD	1.2 V to 3.3 V	Up to 100 kHz
V-FRD	1.1 V to 1.5 V	Up to 60 kHz
FRD	1.2 V to 2.0 V	Up to 20 kHz
General-Purpose	0.95 V to 1.2 V	Up to 3 kHz

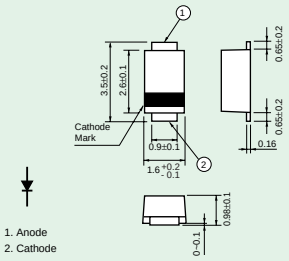
4. Symbols and Terms

Symbols	Terms	Definitions
$I_{F\ (AV)}$	Average Forward Current	Maximum average current value at a half sine wave (conduction angle 180˚) of commercial power supply frequency (50 Hz / 60 Hz) that can flow in the diode under specified conditions
I_o	Average Output Current	Maximum average current value at the full sine wave (conduction angle 360˚) of commercial power supply frequency (50 Hz / 60 Hz) that can flow in the diode under specified conditions
V_{RRM}	Peak Repetitive Reverse Voltage	Instantaneous maximum allowable value of reverse voltage that can be applied repeatedly to the diode
I_{FSM}	Non-Repetitive Peak Surge Current	Non-repetitive maximum allowable peak current in one cycle of a 50-Hz sine wave (conduction angle 180˚) that can flow in the forward direction of the diode at a specified junction temperature. This rating is only applied for an abnormal operation, which seldom occurs during device's lifespan.
$T_{j(max)}$	Junction Temperature	The maximum junction temperature at which the device's reliability and lifetime can be guaranteed. To enhance reliability of a device, please note that 80% derating for the Tj rating is recommended.
T_{stg}	Storage Temperature	The storage temperature Tstg refers to the ambient temperature range within which the device can be stored while not operating
I_{RRM}	Peak Repetitive Reverse Current	Maximum reverse-leakage current value when the specified reverse voltage V_{RRM} is applied
V_{FM}	Peak Forward Voltage	Maximum value of voltage drop when the specified forward current I_{FM} flows
t_{rr}	Reverse Recovery Time	The time required for the current to reach a specified reverse current, after instantaneous switching from forward to reverse (See Figure 1 below.)
V_Z	Zener Voltage	Voltage value when the specified I_Z current flows in reverse between the anode and cathode of a zener diode
r_d	Zener Impedance	Ratio of change in zener voltage to corresponding change in specified current I_Z in zener area
α_T	Temperature Coefficient of Zener Voltage	Ratio of change in zener voltage to corresponding change in junction temperature
P	Zener Power Dissipation	Maximum power dissipation under specified conditions

5.1 General-Purpose Rectifiers

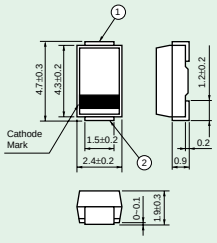
Single

S-FLAT™

Package Appearance	Package Dimensions (mm)	Marking
Package Number ⑭		Typical Laser Mark

Part Number	Maximum Ratings					Electrical Characteristics		
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)
CRG01	100	0.7	15	–40 to 150	–40 to 150	10	1.1	0.7
CRG02	400	0.7	15	–40 to 150	–40 to 150	10	1.1	0.7
CRG03	400	1.0	15	–40 to 150	–40 to 150	10	1.1	0.7

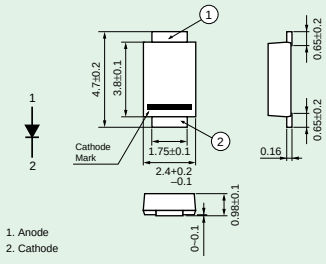
I-FLAT™

Package Appearance	Package Dimensions (mm)	Marking
Package Number ⑯		Typical Laser Mark

Part Number	Maximum Ratings					Electrical Characteristics		
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)
U1BC44	100	1.0	30	–40 to 150	–40 to 150	10	1.2	1.0
U1GC44	400	1.0	30	–40 to 150	–40 to 150	10	1.2	1.0
⁎U1GC44S	400	1.0	30	–40 to 150	–40 to 150	10	1.0	1.0
U1JC44	600	1.0	30	–40 to 150	–40 to 150	10	1.2	1.0

⁎: For strobe discharge circuit

M-FLAT™

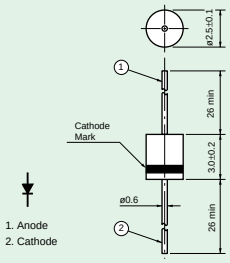
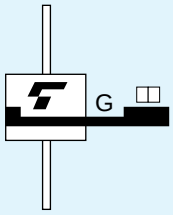
Package Appearance	Package Dimensions (mm)	Marking
Package Number ⑮		Typical Laser Mark

Part Number	Maximum Ratings					Electrical Characteristics		
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)
CMG02	400	2.0	80	–40 to 150	–40 to 150	10	1.1	2.0
⁎CMC01	400	1.0	30	–40 to 150	–40 to 150	10	1.0	1.0

⁎: For strobe discharge circuit

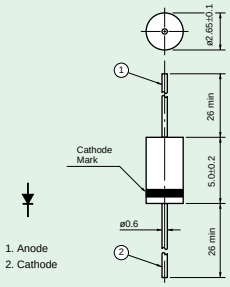
Single

DO-41SS

Package Appearance	Package Dimensions (mm)	Marking
Package Number ①		Typical  Color: Silver

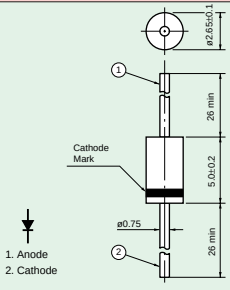
Part Number	Maximum Ratings					Electrical Characteristics		
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)
S5688B	100	1.0	45	–40 to 150	–40 to 150	10	1.2	1.0
S5688G	400	1.0	45	–40 to 150	–40 to 150	10	1.2	1.0
S5688J	600	1.0	30	–40 to 150	–40 to 150	10	1.2	1.0
S5688N	1000	1.0	30	–40 to 150	–40 to 150	10	1.2	1.0

DO-41S

Package Appearance	Package Dimensions (mm)	Marking
Package Number ②		Typical Color: Silver

Part Number	Maximum Ratings					Electrical Characteristics		
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)
S5566B	100	1.0	45	–40 to 150	–40 to 150	10	1.2	1.0
S5566G	400	1.0	45	–40 to 150	–40 to 150	10	1.2	1.0
S5566J	600	1.0	30	–40 to 150	–40 to 150	10	1.2	1.0
S5566N	1000	1.0	30	–40 to 150	–40 to 150	10	1.2	1.0

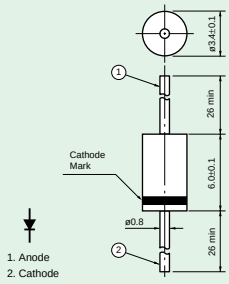
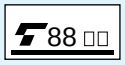
DO-41

Package Appearance	Package Dimensions (mm)	Marking
Package Number ③		Typical Color: Silver

Part Number	Maximum Ratings					Electrical Characteristics		
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)
S5277B	100	1.0	50	–40 to 150	–40 to 150	10	1.2	1.0
S5277G	400	1.0	50	–40 to 150	–40 to 150	10	1.2	1.0
S5277J	600	1.0	30	–40 to 150	–40 to 150	10	1.2	1.0
S5277N	1000	1.0	30	–40 to 150	–40 to 150	10	1.2	1.0

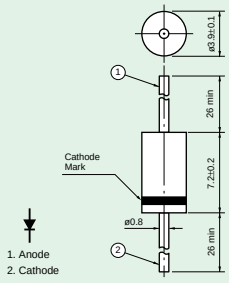
Single

DO-15

Package Appearance	Package Dimensions (mm)	Marking
Package Number ④		Typical  Color: Silver

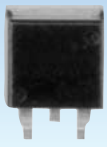
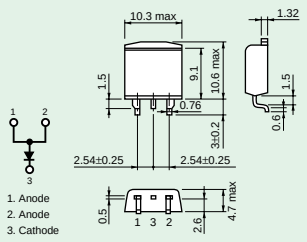
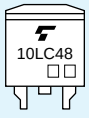
Part Number	Maximum Ratings					Electrical Characteristics		
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)
1S1885	100	1.0	60	–40 to 150	–40 to 150	10	1.2	1.5
1S1887	400	1.0	60	–40 to 150	–40 to 150	10	1.2	1.5
1S1888	600	1.0	60	–40 to 150	–40 to 150	10	1.2	1.5
1S1830	1000	1.0	45	–40 to 150	–40 to 150	10	1.2	1.5
1S1885A	100	1.2	100	–40 to 150	–40 to 150	10	1.0	5.0
1S1887A	400	1.2	100	–40 to 150	–40 to 150	10	1.0	5.0
1S1888A	600	1.2	100	–40 to 150	–40 to 150	10	1.0	5.0

DO-15L

Package Appearance	Package Dimensions (mm)	Marking
Package Number ⑤		Typical Color: Silver

Part Number	Maximum Ratings					Electrical Characteristics		
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)
1R5BZ41	100	1.5	150	–40 to 150	–40 to 150	10	0.95	1.5
1R5GZ41	400	1.5	150	–40 to 150	–40 to 150	10	0.95	1.5
1R5JZ41	600	1.5	100	–40 to 150	–40 to 150	10	1.0	1.5
1R5NZ41	1000	1.5	100	–40 to 150	–40 to 150	10	1.0	1.5

TO-220SM

Package Appearance	Package Dimensions (mm)	Marking
 Package Number ㉑		Typical  Laser Mark

Part Number	Maximum Ratings					Electrical Characteristics		
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)
U10LC48	800	10	180	–40 to 150	–40 to 150	30	1.2	10

5.2 High-Speed Rectifiers (1) Fast Recovery Rectifiers: FRDs

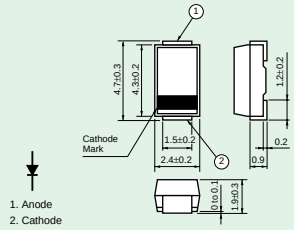
Single

I-FLAT™

Package Appearance

Package Number ⑯

Package Dimensions (mm)



Marking

Typical

Laser Mark

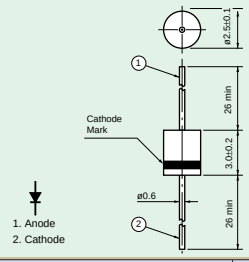
Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (μs)	Cond.
U05GH44	400	0.5	20	–40 to 125	–40 to 125	10	1.2	0.5	1.5	I_F = 20 mA, I_R = 1 mA
U05JH44	600	0.5	20	–40 to 125	–40 to 125	10	1.2	0.5	1.5	I_F = 20 mA, I_R = 1 mA
U05NH44	1000	0.5	20	–40 to 125	–40 to 125	10	1.5	0.5	4.0	I_F = 20 mA, I_R = 1 mA
U05TH44	1500	0.5	20	–40 to 125	–40 to 125	10	1.5	0.5	4.0	I_F = 20 mA, I_R = 1 mA

DO-41SS

Package Appearance

Package Number ①

Package Dimensions (mm)



Marking

Typical

Color: Silver

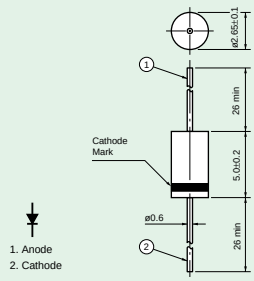
Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (μs)	Cond.
TFR7H	500	0.2	10	–40 to 125	–40 to 125	10	1.5	0.3	10	I_F = 20 mA, I_R = 1 mA
TFR4N	1000	0.3	10	–40 to 125	–40 to 125	10	1.5	0.5	4	I_F = 20 mA, I_R = 1 mA
TFR4T	1500	0.3	10	–40 to 125	–40 to 125	10	1.5	0.5	4	I_F = 20 mA, I_R = 1 mA
TVR5B	100	0.5	20	–40 to 125	–40 to 125	10	1.2	0.5	1.5	I_F = 20 mA, I_R = 1 mA
TVR5G	400	0.5	20	–40 to 125	–40 to 125	10	1.2	0.5	1.5	I_F = 20 mA, I_R = 1 mA
TVR5J	600	0.5	20	–40 to 125	–40 to 125	10	1.2	0.5	1.5	I_F = 20 mA, I_R = 1 mA
1NH42	1000	1.0	30	–40 to 150	–40 to 150	10	1.3	1.0	0.4	I_F = 1 A, di/dt = –30 A/μs

DO-41S

Package Appearance

Package Number ②

Package Dimensions (mm)



Marking

Typical

Color: Silver

Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (μs)	Cond.
TFR3N	1000	0.2	10	–40 to 125	–40 to 125	5	1.5	0.1	1.5	I_F = 10 mA, I_R = 10 mA
TFR3T	1500	0.2	10	–40 to 125	–40 to 125	5	1.5	0.1	1.5	I_F = 10 mA, I_R = 10 mA
1NH41	1000	1.0	30	–40 to 150	–40 to 150	10	1.3	1.0	0.4	I_F = 1 A, di/dt = –30 A/μs

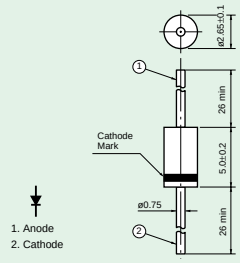
Single

DO-41

Package Appearance

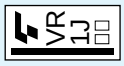
Package Number ③

Package Dimensions (mm)



Marking

Typical



Color: Silver

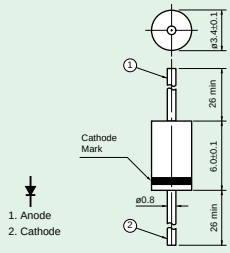
Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (μs)	Cond.
TVR1B	100	0.5	10	–40 to 125	–40 to 125	10	1.2	0.5	2.0	I_F = 20 mA, I_R = 1 mA
TVR1G	400	0.5	10	–40 to 125	–40 to 125	10	1.2	0.5	2.0	I_F = 20 mA, I_R = 1 mA
TVR1J	600	0.5	10	–40 to 125	–40 to 125	10	1.2	0.5	2.0	I_F = 20 mA, I_R = 1 mA
TFR2N	1000	0.5	20	–40 to 125	–40 to 125	10	1.5	0.5	4.0	I_F = 20 mA, I_R = 1 mA
TFR2T	1500	0.5	20	–40 to 125	–40 to 125	10	1.5	0.5	4.0	I_F = 20 mA, I_R = 1 mA
TFR1N	1000	0.5	20	–40 to 125	–40 to 125	10	1.3	0.5	10	I_F = 20 mA, I_R = 1 mA
TFR1T	1500	0.5	20	–40 to 125	–40 to 125	10	1.3	0.5	10	I_F = 20 mA, I_R = 1 mA
TVR2B	100	0.5	30	–40 to 125	–40 to 125	10	1.4	1.0	20	I_F = 20 mA, I_R = 1 mA
TVR2G	400	0.5	30	–40 to 125	–40 to 125	10	1.4	1.0	20	I_F = 20 mA, I_R = 1 mA
TVR2J	600	0.5	30	–40 to 125	–40 to 125	10	1.4	1.0	20	I_F = 20 mA, I_R = 1 mA

DO-15

Package Appearance

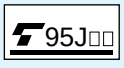
Package Number ④

Package Dimensions (mm)



Marking

Typical

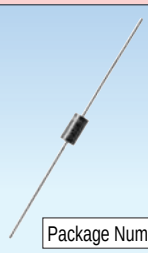


Color: Silver

Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (μs)	Cond.
S5295B	100	0.5	30	–40 to 125	–40 to 125	10	1.5	1.0	1.5	I_F = 20 mA, I_R = 1 mA
S5295G	400	0.5	30	–40 to 125	–40 to 125	10	1.5	1.0	1.5	I_F = 20 mA, I_R = 1 mA
S5295J	600	0.5	30	–40 to 125	–40 to 125	10	1.5	1.0	1.5	I_F = 20 mA, I_R = 1 mA
1S1832	1800	0.7	60	–40 to 125	–40 to 125	10	2.0	1.5	6.0	I_F = 20 mA, I_R = 1 mA
1S1834	400	1.0	60	–40 to 125	–40 to 125	10	1.2	1.5	1.5	I_F = 20 mA, I_R = 1 mA
1S1835	600	1.0	60	–40 to 125	–40 to 125	10	1.2	1.5	1.5	I_F = 20 mA, I_R = 1 mA

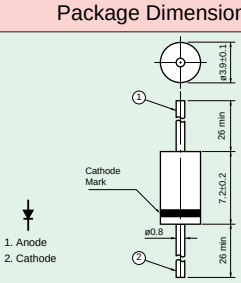
DO-15L

Package Appearance



Package Number ⑤

Package Dimensions (mm)



Marking

Typical

Color: Silver

Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (μs)	Cond.
TVR4J	600	1.2	100	–40 to 150	–40 to 150	10	1.2	5	20	I_F = 20 mA, I_R = 1 mA
TVR4N	1000	1.2	100	–40 to 150	–40 to 150	10	1.2	5	20	I_F = 20 mA, I_R = 1 mA
1R5NH41	1000	1.5	80	–40 to 150	–40 to 150	10	1.3	1.5	0.4	I_F = 1 A, di/dt = –30 A/μs

5.2 High-Speed Rectifiers (2) Very-Fast Recovery Diodes: V-FRDs

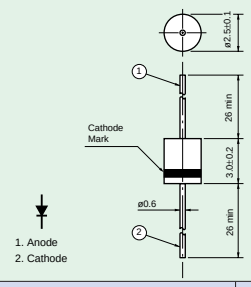
Single

DO-41SS

Package Appearance

Package Number ①

Package Dimensions (mm)



Marking

Typical

Color: Silver

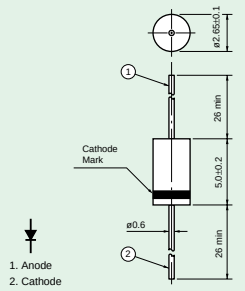
Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (ns)	Cond.
05NH46	1000	0.5	15	–40 to 150	–40 to 150	100	1.5	0.5	200	I_F = 1 A, di/dt = –30 A/μs
1GH46	400	1.0	15	–40 to 150	–40 to 150	100	1.1	1.0	200	I_F = 1 A, di/dt = –30 A/μs
1JH46	600	1.0	15	–40 to 150	–40 to 150	100	1.2	1.0	200	I_F = 1 A, di/dt = –30 A/μs

DO-41S

Package Appearance

Package Number ②

Package Dimensions (mm)



Marking

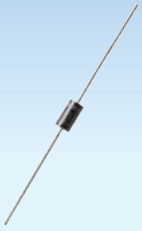
Typical

Color: Silver

Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (ns)	Cond.
05NH45	1000	0.5	20	–40 to 150	–40 to 150	100	1.5	0.5	200	I_F = 1 A, di/dt = –30 A/μs
1GH45	400	1.0	20	–40 to 150	–40 to 150	100	1.1	1.0	200	I_F = 1 A, di/dt = –30 A/μs
1JH45	600	1.0	20	–40 to 150	–40 to 150	100	1.2	1.0	200	I_F = 1 A, di/dt = –30 A/μs

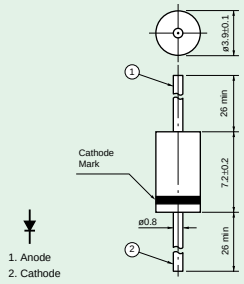
DO-15L

Package Appearance



Package Number ⑤

Package Dimensions (mm)



Marking

Typical

Color: Silver

Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (ns)	Cond.
1R5GH45	400	1.5	50	–40 to 150	–40 to 150	100	1.1	1.5	200	I_F = 1 A, di/dt = –30 A/μs
1R5JH45	600	1.5	50	–40 to 150	–40 to 150	100	1.2	1.5	200	I_F = 1 A, di/dt = –30 A/μs
1R5NH45	1000	1.5	30	–40 to 150	–40 to 150	100	1.5	1.5	200	I_F = 1 A, di/dt = –30 A/μs

5.2 High-Speed Rectifiers (3) Super-Fast Recovery Diodes: S-FRDs

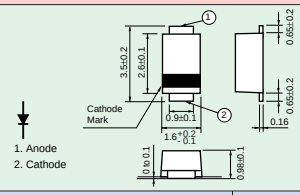
Single

S-FLAT™

Package Appearance

Package Number ⑭

Package Dimensions (mm)



Marking

Typical

Laser Mark

Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (ns)	Cond.
⁎CRF02	800	0.5	10	–40 to 150	–40 to 150	50	3.0	0.5	100	I_F = 1 A, di/dt = –30 A/μs
CRF03	600	0.7	10	–40 to 150	–40 to 150	50	2.0	0.7	100	I_F = 1 A, di/dt = –30 A/μs

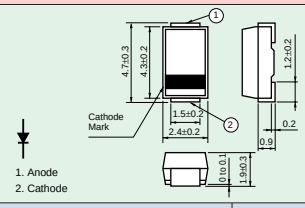
⁎: For strobe discharge circuit

I-FLAT™

Package Appearance

Package Number ⑯

Package Dimensions (mm)



Marking

Typical

Laser Mark

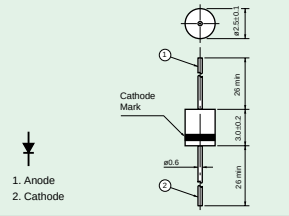
Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (ns)	Cond.
U05NU44	1000	0.5	10	–40 to 150	–40 to 150	100	3.0	0.5	100	I_F = 1 A, di/dt = –30 A/μs
U1GU44	400	1.0	15	–40 to 150	–40 to 150	50	1.5	1.0	100	I_F = 1 A, di/dt = –30 A/μs
U1JU44	600	1.0	15	–40 to 150	–40 to 150	100	2.0	1.0	100	I_F = 1 A, di/dt = –30 A/μs

DO-41SS

Package Appearance

Package Number ①

Package Dimensions (mm)



Marking

Typical

Color: Silver

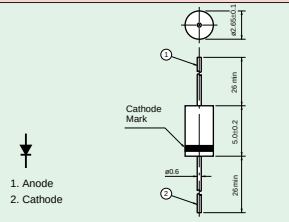
Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (ns)	Cond.
05NU42	1000	0.5	10	–40 to 150	–40 to 150	100	3.0	0.5	100	I_F = 1 A, di/dt = –30 A/μs
1GU42	400	1.0	15	–40 to 150	–40 to 150	50	1.5	1.0	100	I_F = 1A, di/dt = –30 A/μs
1JU42	600	1.0	15	–40 to 150	–40 to 150	100	2.0	1.0	100	I_F = 1A, di/dt = –30 A/μs

DO-41S

Package Appearance

Package Number ②

Package Dimensions (mm)



Marking

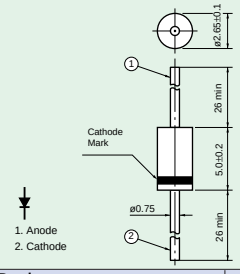
Typical

Color: Silver

Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (ns)	Cond.
05NU41	1000	0.5	10	–40 to 150	–40 to 150	100	3.0	0.5	100	I_F = 1 A, di/dt = –30 A/μs
1JU41	600	1.0	30	–40 to 150	–40 to 150	100	2.0	1.0	100	I_F = 1 A, di/dt = –30 A/μs

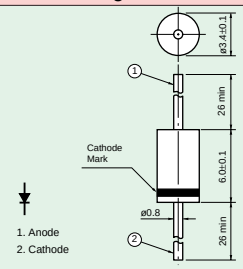
Single

DO-41

Package Appearance	Package Dimensions (mm)	Marking
Package Number ③		Typical Color: Silver

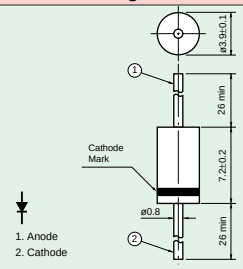
Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (ns)	Cond.
0R8GU41	400	0.8	30	–40 to 150	–40 to 150	50	1.5	1.0	100	I_F = 1 A, di/dt = –30 A/μs

DO-15

Package Appearance	Package Dimensions (mm)	Marking
Package Number ④		Typical Color: Silver

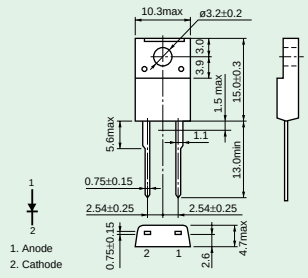
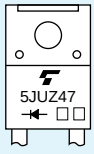
Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (ns)	Cond.
1NU41	1000	1.0	10	–40 to 150	–40 to 150	100	3.3	1.0	100	I_F = 1 A, di/dt = –30 A/μs

DO-15L

Package Appearance	Package Dimensions (mm)	Marking
Package Number ⑤		Typical Color: Silver

Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (ns)	Cond.
1R5GU41	400	1.5	60	–40 to 150	–40 to 150	50	1.2	1.5	100	I_F = 1 A, di/dt = –30 A/μs
1R5JU41	600	1.5	40	–40 to 150	–40 to 150	100	2.0	2.0	100	I_F = 1 A, di/dt = –30 A/μs
1R5NU41	1000	1.5	60	–40 to 150	–40 to 150	100	3.0	2.0	100	I_F = 1 A, di/dt = –30 A/μs

TO-220NIS
(Center lead less)

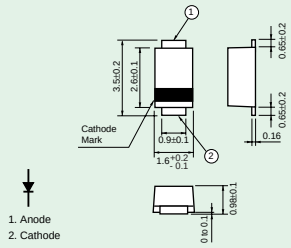
Package Appearance	Package Dimensions (mm)	Marking
Package Number ⑥		Typical  Laser Mark

Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (ns)	Cond.
5GUZ47	400	5.0	50	–40 to 150	–40 to 150	100	1.2	5.0	100	I_F = 2A, di/dt = –20 A/μs
5JUZ47	600	5.0	50	–40 to 150	–40 to 150	100	1.5	5.0	100	I_F = 2A, di/dt = –20 A/μs

5.2 High-Speed Rectifiers (4) High-Efficiency Diodes: HEDs

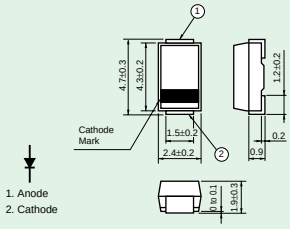
Single

S-FLAT™

Package Appearance	Package Dimensions (mm)	Marking
Package Number ⑭		Typical Laser Mark

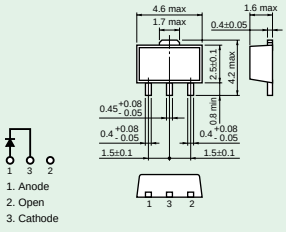
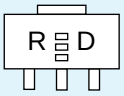
Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (ns)	Cond.
CRH01	200	1.0	15	–40 to 150	–40 to 150	10	0.98	1.0	35	I_F = 1 A, di/dt = –30 A/μs

I-FLAT™

Package Appearance	Package Dimensions (mm)	Marking
Package Number ⑯		Typical Laser Mark

Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (ns)	Cond.
U1DL44A	200	1.0	10	–40 to 150	–40 to 150	10	0.98	1.0	35	I_F = 1 A, di/dt = –30 A/μs

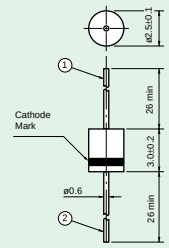
PW-MINI

Package Appearance	Package Dimensions (mm)	Marking
Package Number ⑱		Typical  Part Number: Pad Print Lot Number: Laser Mark

Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (ns)	Cond.
U1DL49	200	1.0	15	–40 to 150	–40 to 150	10	0.98	1.0	60	I_F = 1 A, di/dt = –20 A/μs

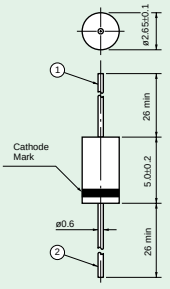
Single

DO-41SS

Package Appearance	Package Dimensions (mm)	Marking
Package Number ①		Typical DLA □□ Color: Silver

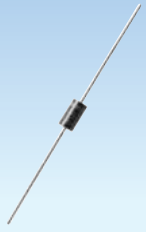
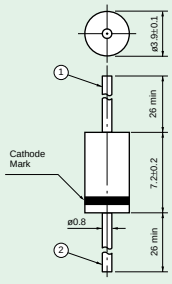
Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (ns)	Cond.
1DL42A	200	1.0	30	–40 to 150	–40 to 150	100	0.98	1.0	35	I_F = 1 A, di/dt = –30 A/μs

DO-41S

Package Appearance	Package Dimensions (mm)	Marking
Package Number ②		Typical DLA □□ Color: Silver

Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (ns)	Cond.
1DL41A	200	1.0	30	–40 to 150	–40 to 150	100	0.98	1.0	35	I_F = 1 A, di/dt = –30 A/μs

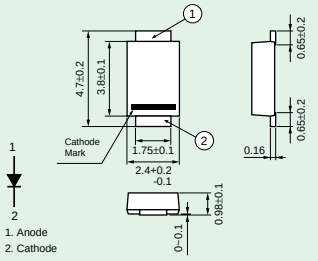
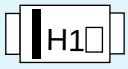
DO-15L

Package Appearance	Package Dimensions (mm)	Marking
 Package Number ⑤		Typical DLA □□ Color: Silver

Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (ns)	Cond.
1R5DL41A	200	1.5	60	–40 to 150	–40 to 150	100	0.98	1.5	35	I_F = 1 A, di/dt = –30 A/μs

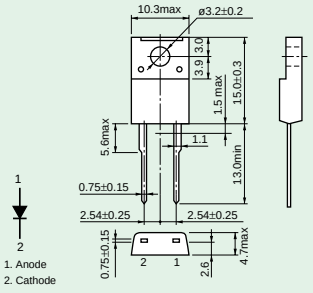
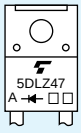
Single

M-FLAT™

Package Apearance	Package Dimensions (mm)	Marking
Package Number ⑮		Typical  Laser Mark

Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (ns)	Cond.
CMH04	200	1.0	20	–40 to 150	–40 to 150	10	0.98	1.0	35	I_F = 1 A, di/dt = –30 A/μs
CMH05	400	1.0	30	–40 to 150	–40 to 150	10	1.5	1.0	50	I_F = 1 A, di/dt = –30 A/μs
CMH05A	400	1.0	30	–40 to 150	–40 to 150	10	1.8	1.0	35	I_F = 1 A, di/dt = –30 A/μs
CMH07	200	2.0	40	–40 to 150	–40 to 150	10	0.98	2.0	35	I_F = 1 A, di/dt = –30 A/μs
CMH08	400	2.0	40	–40 to 150	–40 to 150	10	1.5	2.0	50	I_F = 1 A, di/dt = –30 A/μs
CMH08A	400	2.0	40	–40 to 150	–40 to 150	10	1.8	2.0	35	I_F = 1 A, di/dt = –30 A/μs
CMH01	200	3.0	40	–40 to 150	–40 to 150	10	0.98	3.0	35	I_F = 1 A, di/dt = –30 A/μs
CMH02	400	3.0	40	–40 to 150	–40 to 150	10	1.5	3.0	50	I_F = 1 A, di/dt = –30 A/μs
CMH02A	400	3.0	40	–40 to 150	–40 to 150	10	1.8	3.0	35	I_F = 1 A, di/dt = –30 A/μs

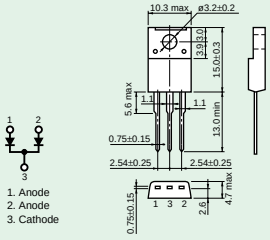
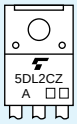
TO-220NIS
(Center lead less)

Package Apearance	Package Dimensions (mm)	Marking
Package Number ⑥		Typical  Laser Mark

Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (ns)	Cond.
5DLZ47A	200	5.0	50	–40 to 150	–40 to 150	10	0.98	5.0	35	I_F = 2 A, di/dt = –20 A/μs
5GLZ47A	400	5.0	50	–40 to 150	–40 to 150	50	1.8	5.0	35	I_F = 2 A, di/dt = –20 A/μs
5JLZ47	600	5.0	50	–40 to 150	–40 to 150	50	2.0	5.0	50	I_F = 2 A, di/dt = –20 A/μs
5JLZ47A	600	5.0	40	–40 to 150	–40 to 150	50	4.0	5.0	35	I_F = 2 A, di/dt = –20 A/μs

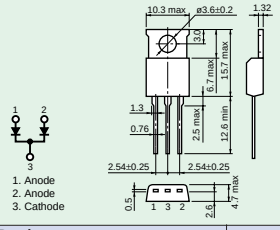
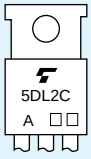
Center-tap

TO-220NIS

Package Apearance	Package Dimensions (mm)	Marking
Package Number ⑨		Typical  Laser Mark

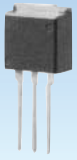
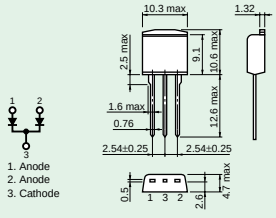
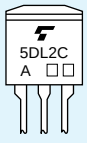
Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	I_O (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (ns)	Cond.
5DL2CZ47A	200	5.0	25	–40 to 150	–40 to 150	10	0.98	2.5	35	I_F = 2 A, di/dt = –20 A/μs
5FL2CZ47A	300	5.0	25	–40 to 150	–40 to 150	10	1.3	2.5	35	I_F = 2 A, di/dt = –20 A/μs
5GL2CZ47A	400	5.0	25	–40 to 150	–40 to 150	50	1.8	2.5	35	I_F = 2 A, di/dt = –20 A/μs
5JL2CZ47	600	5.0	25	–40 to 150	–40 to 150	50	2.0	2.5	50	I_F = 2 A, di/dt = –20 A/μs
10DL2CZ47A	200	10	50	–40 to 150	–40 to 150	10	0.98	5.0	35	I_F = 2 A , di/dt = –20 A/μs
10FL2CZ47A	300	10	50	–40 to 150	–40 to 150	10	1.3	5.0	35	I_F = 2 A, di/dt = –20 A/μs
10GL2CZ47A	400	10	50	–40 to 150	–40 to 150	50	1.8	5.0	35	I_F = 2 A, di/dt = –20 A/μs
10JL2CZ47	600	10	50	–40 to 150	–40 to 150	50	2.0	5.0	50	I_F = 2 A, di/dt = –20 A/μs
10JL2CZ47A	600	10	40	–40 to 150	–40 to 150	50	4.0	5.0	35	I_F = 2 A, di/dt = –20 A/μs
16DL2CZ47A	200	16	80	–40 to 150	–40 to 150	50	0.98	8.0	35	I_F = 2 A, di/dt = –50 A/μs
16FL2CZ47A	300	16	80	–40 to 150	–40 to 150	50	1.3	8.0	35	I_F = 2 A, di/dt = –50 A/μs
20DL2CZ47A	200	20	100	–40 to 150	–40 to 150	50	0.98	10	35	I_F = 2 A, di/dt = –50 A/μs
20FL2CZ47A	300	20	100	–40 to 150	–40 to 150	50	1.3	10	35	I_F = 2 A, di/dt = –50 A/μs

TO-220AB

Package Apearance	Package Dimensions (mm)	Marking
Package Number ⑧		Typical  Laser Mark

Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	I_O (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (ns)	Cond.
5DL2C41A	200	5.0	25	–40 to 150	–40 to 150	10	0.98	2.5	35	I_F = 2 A, di/dt = –20 A/μs
10DL2C41A	200	10	50	–40 to 150	–40 to 150	10	0.98	5.0	35	I_F = 2 A, di/dt = –20 A/μs

TO-220FL

Package Apearance	Package Dimensions (mm)	Marking
 Package Number ⑦		Typical  Laser Mark

Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	I_O (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (ns)	Cond.
5DL2C48A	200	5.0	25	–40 to 150	–40 to 150	10	0.98	2.5	35	I_F = 2 A, di/dt = –20 A/μs
5FL2C48A	300	5.0	25	–40 to 150	–40 to 150	10	1.3	2.5	35	I_F = 2 A, di/dt = –20 A/μs
10DL2C48A	200	10	50	–40 to 150	–40 to 150	10	0.98	5.0	35	I_F = 2 A, di/dt = –20 A/μs
10FL2C48A	300	10	50	–40 to 150	–40 to 150	10	1.3	5.0	35	I_F = 2 A, di/dt = –20 A/μs
10JL2C48A	600	10	40	–40 to 150	–40 to 150	50	4.0	5.0	35	I_F = 2 A, di/dt = –20 A/μs
20DL2C48A	200	20	100	–40 to 150	–40 to 150	50	0.98	10	35	I_F = 2 A, di/dt = –50 A/μs
20FL2C48A	300	20	100	–40 to 150	–40 to 150	50	1.3	10	35	I_F = 2 A, di/dt = –50 A/μs

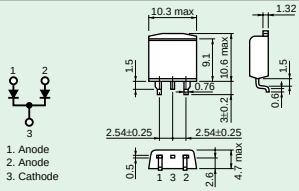
Center-tap

TO-220SM

Package Appearance

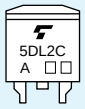
Package Number ㉑

Package Dimensions (mm)



Marking

Typical



Laser Mark

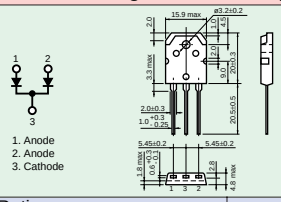
Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	I_O (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (ns)	Cond.
U5DL2C48A	200	5.0	25	–40 to 150	–40 to 150	10	0.98	2.5	35	I_F = 2 A, di/dt = –20 A/μs
U5FL2C48A	300	5.0	25	–40 to 150	–40 to 150	10	1.3	2.5	35	I_F = 2 A, di/dt = –20 A/μs
U10DL2C48A	200	10	50	–40 to 150	–40 to 150	10	0.98	5.0	35	I_F = 2 A, di/dt = –20 A/μs
U10FL2C48A	300	10	50	–40 to 150	–40 to 150	10	1.3	5.0	35	I_F = 2 A, di/dt = –20 A/μs
U10JL2C48A	600	10	40	–40 to 150	–40 to 150	50	4.0	5.0	35	I_F = 2 A, di/dt = –20 A/μs
U20DL2C48A	200	20	100	–40 to 150	–40 to 150	50	0.98	10	35	I_F = 2 A, di/dt = –50 A/μs
U20FL2C48A	300	20	100	–40 to 150	–40 to 150	50	1.3	10	35	I_F = 2 A, di/dt = –50 A/μs
U20GL2C48A	400	20	100	–40 to 150	–40 to 150	50	1.8	10	35	I_F = 2 A, di/dt = –50 A/μs
U20JL2C48A	600	20	80	–40 to 150	–40 to 150	50	3.2	10	35	I_F = 2 A, di/dt = –50 A/μs

TO-3P(N)

Package Appearance

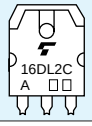
Package Number ⑩

Package Dimensions (mm)



Marking

Typical



Color: White

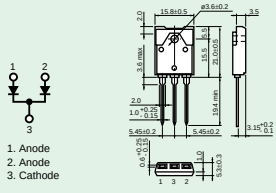
Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	I_O (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (ns)	Cond.
16DL2C41A	200	16	80	–40 to 150	–40 to 150	50	0.98	8.0	35	I_F = 2 A, di/dt = –50 A/μs
16FL2C41A	300	16	80	–40 to 150	–40 to 150	50	1.3	8.0	35	I_F = 2 A, di/dt = –50 A/μs
20DL2C41A	200	20	100	–40 to 150	–40 to 150	50	0.98	10	35	I_F = 2 A, di/dt = –50 A/μs
20FL2C41A	300	20	100	–40 to 150	–40 to 150	50	1.3	10	35	I_F = 2 A, di/dt = –50 A/μs
20GL2C41A	400	20	100	–40 to 150	–40 to 150	50	1.8	10	35	I_F = 2 A, di/dt = –50 A/μs
20JL2C41	600	20	100	–40 to 150	–40 to 150	50	2.0	10	50	I_F = 2 A, di/dt = –50 A/μs
20JL2C41A	600	20	80	–40 to 150	–40 to 150	100	3.2	10	35	I_F = 2 A, di/dt = –50 A/μs
30JL2C41	600	30	150	–40 to 150	–40 to 150	50	2.0	15	50	I_F = 2 A, di/dt = –50 A/μs

TO-3P(N)IS

Package Appearance

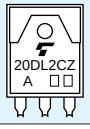
Package Number ⑪

Package Dimensions (mm)



Marking

Typical



Color: White

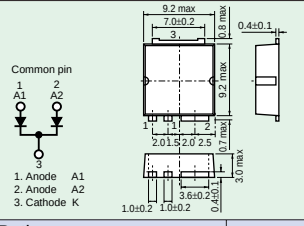
Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	I_O (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (ns)	Cond.
20DL2CZ51A	200	20	100	–40 to 150	–40 to 150	50	0.98	10	35	I_F = 2 A, di/dt = –50 A/μs
20FL2CZ51A	300	20	100	–40 to 150	–40 to 150	50	1.3	10	35	I_F = 2 A, di/dt = –50 A/μs

TFP

Package Appearance

Package Number ㉒

Package Dimensions (mm)



Marking

Typical

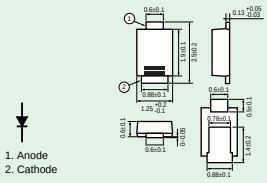
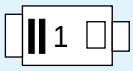
Laser Mark

Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	I_O (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	V_{FM} (V)	@I_{FM} (A)	t_{rr} (ns)	Cond.
U20DL2C53A	200	20	100	–40 to 150	–40 to 150	50	0.98	10	35	I_F = 2 A, di/dt = –50 A/μs
U20GL2C53A	400	20	100	–40 to 150	–40 to 150	50	1.8	10	35	I_F = 2 A, di/dt = –50 A/μs

5.3 Schottky Barrier Diodes: SBDs

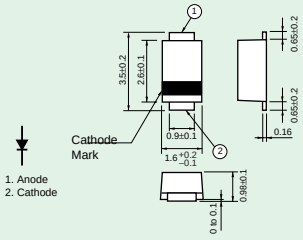
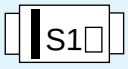
Single

US-FLAT™

Package Appearance	Package Dimensions (mm)	Marking
Package Number ⑬		Typical  Laser Mark

Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (mA)	V_{FM} (V)	@I_{FM} (A)	C_j (pF)(Typ.)	Cond.
CUS01	30	1.0	20	–40 to 125	–40 to 150	1.5	0.37	0.7	40	V_R = 10 V, f = 1 MHz
CUS02	30	1.0	20	–40 to 125	–40 to 150	0.1	0.45	0.7	40	V_R = 10 V, f = 1 MHz
CUS03	40	0.7	20	–40 to 125	–40 to 150	0.1	0.52	0.7	40	V_R = 10 V, f = 1 MHz
CUS04	60	0.7	20	–40 to 125	–40 to 150	0.1	0.58	0.7	–	–

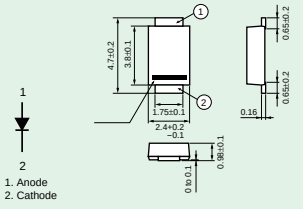
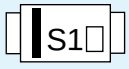
S-FLAT™

Package Appearance	Package Dimensions (mm)	Marking
Package Number ⑭		Typical  Laser Mark

Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (mA)	V_{FM} (V)	@I_{FM} (A)	C_j (pF)(Typ.)	Cond.
CRS01	30	1.0	20	–40 to 125	–40 to 125	1.5	0.37	0.7	40	V_R = 10 V, f = 1 MHz
CRS02	30	1.0	20	–40 to 125	–40 to 125	0.05	0.4	0.7	40	V_R = 10 V, f = 1 MHz
CRS03	30	1.0	20	–40 to 150	–40 to 150	0.1	0.45	0.7	40	V_R = 10 V, f = 1 MHz
CRS04	40	1.0	20	–40 to 150	–40 to 150	0.1	0.49	0.7	47	V_R = 10 V, f = 1 MHz
CRS05	30	1.0	20	–40 to 150	–40 to 150	✻	0.45	1.0	60	V_R = 10 V, f = 1 MHz
CRS06	20	1.0	20	–40 to 125	–40 to 125	1.0	0.36	1.0	60	V_R = 10 V, f = 1 MHz
CRS08	30	1.5	30	–40 to 125	–40 to 150	1.0	0.36	1.5	90	V_R = 10 V, f = 1 MHz
CRS09	30	1.5	30	–40 to 150	–40 to 150	0.05	0.46	1.5	90	V_R = 10 V, f = 1 MHz
CRS11	30	1.0	20	–40 to 125	–40 to 150	1.5	0.36	1.0	60	V_R = 10 V, f = 1 MHz
CRS12	60	1.0	20	–40 to 150	–40 to 150	0.1	0.58	1.0	40	V_R = 10 V, f = 1 MHz

✻I_{RRM} = 5 µA Max (V_R = 5 V)

M-FLAT™

Package Appearance	Package Dimensions (mm)	Marking
Package Number ⑮		Typical  Laser Mark

Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (mA)	V_{FM} (V)	@I_{FM} (A)	C_j (pF)(Typ.)	Cond.
CMS01	30	3.0	40	–40 to 125	–40 to 150	5.0	0.37	3.0	190	V_R = 10 V, f = 1 MHz
CMS02	30	3.0	40	–40 to 125	–40 to 150	0.5	0.4	3.0	170	V_R = 10 V, f = 1 MHz
CMS03	30	3.0	40	–40 to 150	–40 to 150	0.5	0.45	3.0	190	V_R = 10 V, f = 1 MHz
CMS04	30	5.0	70	–40 to 125	–40 to 150	8.0	0.37	5.0	330	V_R = 10 V, f = 1 MHz
CMS05	30	5.0	70	–40 to 150	–40 to 150	0.8	0.45	5.0	330	V_R = 10 V, f = 1 MHz
CMS06	30	2.0	40	–40 to 125	–40 to 150	3.0	0.37	2.0	130	V_R = 10 V, f = 1 MHz
CMS07	30	2.0	40	–40 to 150	–40 to 150	0.5	0.45	2.0	130	V_R = 10 V, f = 1 MHz
CMS08	30	1.0	25	–40 to 125	–40 to 150	1.5	0.37	1.0	70	V_R = 10 V, f = 1 MHz
CMS09	30	1.0	25	–40 to 150	–40 to 150	0.5	0.45	1.0	70	V_R = 10 V, f = 1 MHz
CMS10	40	1.0	25	–40 to 150	–40 to 150	0.5	0.55	1.0	50	V_R = 10 V, f = 1 MHz
CMS11	40	2.0	30	–40 to 150	–40 to 150	0.5	0.55	2.0	95	V_R = 10 V, f = 1 MHz
CMS16	40	3.0	30	–40 to 150	–40 to 150	0.2	0.55	3.0	95	V_R = 10 V, f = 1 MHz
CMS14	60	2.0	40	–40 to 150	–40 to 150	0.2	0.58	2.0	77	V_R = 10 V, f = 1 MHz
CMS15	60	3.0	60	–40 to 150	–40 to 150	0.3	0.58	3.0	102	V_R = 10 V, f = 1 MHz

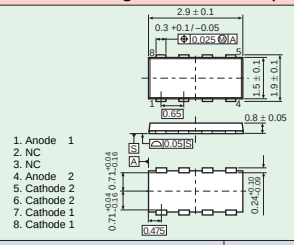
Single

VS-8

Package Appearance

Package Number ⑰

Package Dimensions (mm)



Marking

Typical

Laser Mark

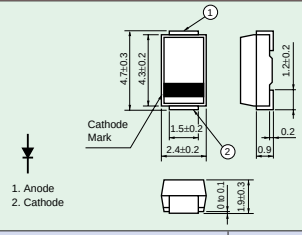
Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (mA)	V_{FM} (V)	@I_{FM} (A)	C_j (pF)(Typ.)	Cond.
TPCF8E02	30	1.0	7	–40 to 150	–40 to 150	0.1	0.49	1.0	54	V_R = 10 V, f = 1 MHz

I-FLAT™

Package Appearance

Package Number ⑯

Package Dimensions (mm)



Marking

Typical

Laser Mark

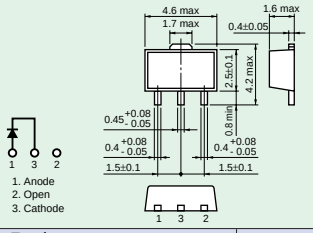
Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (mA)	V_{FM} (V)	@I_{FM} (A)	C_j (pF)(Typ.)	Cond.
U1FWJ44N	30	1.0	25	–40 to 125	–40 to 125	1.5	0.37	1.0	62	V_R = 10 V, f = 1 MHz
U1FWJ44L	30	1.0	20	–40 to 125	–40 to 125	0.8	0.4	1.0	60	V_R = 10 V, f = 1 MHz
U1FWJ44M	30	1.0	20	–40 to 125	–40 to 125	0.5	0.45	1.0	60	V_R = 10 V, f = 1 MHz
U1GWJ44	40	1.0	25	–40 to 125	–40 to 125	0.5	0.55	1.0	47	V_R = 10 V, f = 1 MHz
U2FWJ44N	30	2.0	80	–40 to 125	–40 to 125	3.0	0.37	2.0	130	V_R = 10 V, f = 1 MHz
U2FWJ44M	30	2.0	60	–40 to 125	–40 to 125	0.5	0.45	2.0	125	V_R = 10 V, f = 1 MHz
U2GWJ44	40	2.0	40	–40 to 125	–40 to 125	0.5	0.55	2.0	125	V_R = 10 V, f = 1 MHz

PW-MINI

Package Appearance

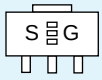
Package Number ⑱

Package Dimensions (mm)



Marking

Typical



Part Number : Pad Print
Lot Number : Laser Mark

Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (mA)	V_{FM} (V)	@I_{FM} (A)	C_j (pF)(Typ.)	Cond.
U1GWJ49	40	1.0	15	–40 to 125	–40 to 150	0.5	0.55	1.0	50	V_R = 10 V, f = 1 MHz

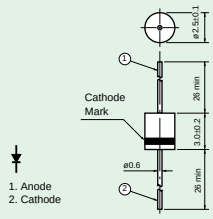
Single

DO-41SS

Package Appearance

Package Number ①

Package Dimensions (mm)



Marking

Typical

Color: Silver

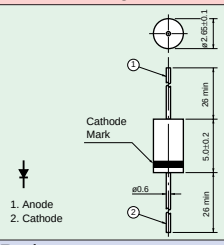
Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (mA)	V_{FM} (V)	@I_{FM} (A)	C_j (pF)(Typ.)	Cond.
1FWJ43N	30	1.0	25	–40 to 125	–40 to 125	1.5	0.37	1.0	62	V_R =10V, f =1MHz
1FWJ43M	30	1.0	20	–40 to 125	–40 to 125	0.5	0.45	1.0	60	V_R =10V, f =1MHz
1FWJ43L	30	1.0	20	–40 to 125	–40 to 125	0.8	0.4	1.0	60	V_R =10V, f =1MHz
1GWJ43	40	1.0	25	–40 to 125	–40 to 125	0.5	0.55	1.0	52	V_R =10V, f =1MHz

DO-41S

Package Appearance

Package Number ②

Package Dimensions (mm)



Marking

Typical

Color: Silver

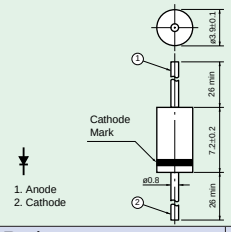
Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (mA)	V_{FM} (V)	@I_{FM} (A)	C_j (pF)(Typ.)	Cond.
1GWJ42	40	1.0	40	–40 to 125	–40 to 125	0.5	0.55	1.0	52	V_R = 10 V, f = 1 MHz

DO-15L

Package Appearance

Package Number ⑤

Package Dimensions (mm)



Marking

Typical

Color: Silver

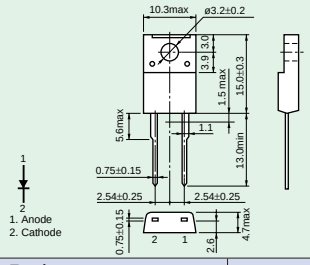
Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (mA)	V_{FM} (V)	@I_{FM} (A)	C_j (pF)(Typ.)	Cond.
2FWJ42N	30	2.0	60	–40 to 125	–40 to 125	3.0	0.37	2.0	130	V_R = 10 V, f = 1 MHz
2FWJ42M	30	2.0	60	–40 to 125	–40 to 125	0.5	0.45	2.0	110	V_R = 10 V, f = 1 MHz
2GWJ42	40	2.0	100	–40 to 125	–40 to 125	0.5	0.55	2.0	125	V_R = 10 V, f = 1 MHz
2GWJ42C	40	2.0	40	–40 to 125	–40 to 125	0.5	0.55	2.0	125	V_R = 10 V, f = 1 MHz

TO-220NIS
(Center lead less)

Package Appearance

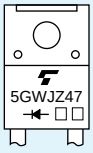
Package Number ⑥

Package Dimensions (mm)



Marking

Typical

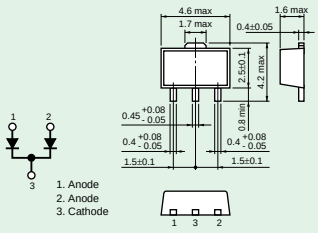
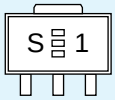


Laser Mark

Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (mA)	V_{FM} (V)	@I_{FM} (A)	C_j (pF)(Typ.)	Cond.
5GWJZ47	40	5.0	50	–40 to 125	–40 to 150	3.5	0.55	5.0	200	V_R = 10 V, f = 1 MHz

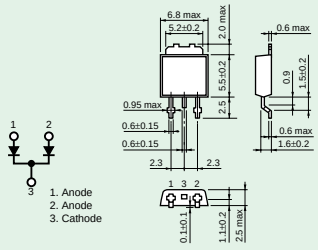
Center-tap

PW-MINI

Package Appearance	Package Dimensions (mm)	Marking
Package Number ⑲		Typical  Part Number : Pad Print Lot Number : Laser Mark

Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	I_o (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (mA)	V_{FM} (V)	@I_{FM} (A)	C_j (pF)(Typ.)	Cond.
U1GWJ2C49	40	1.0	15	–40 to 125	–40 to 150	0.5	0.55	0.5	25	V_R = 10 V, f = 1 MHz

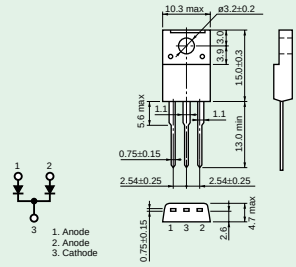
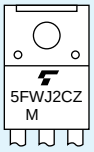
DP

Package Appearance	Package Dimensions (mm)	Marking
Package Number ⑳		Typical Laser Mark

Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	I_o (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (mA)	V_{FM} (V)	@I_{FM} (A)	C_j (pF)(Typ.)	Cond.
U5FWK2C42	30	5.0	50	–40 to 125	–40 to 125	0.3	0.4	2.5	145	V_R = 10 V, f = 1 MHz

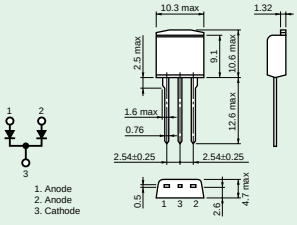
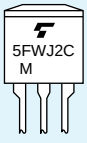
Center-tap

TO-220NIS

Package Appearance	Package Dimensions (mm)	Marking
Package Number ⑨		Typical  Laser Mark

Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	I_o (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (mA)	V_{FM} (V)	@I_{FM} (A)	C_j (pF)(Typ.)	Cond.
5FWJ2CZ47M	30	5.0	50	–40 to 125	–40 to 150	3.5	0.47	2.5	138	V_R = 10 V, f = 1 MHz
5GWJ2CZ47C	40	5.0	50	–40 to 125	–40 to 150	3.5	0.55	2.5	100	V_R = 10 V, f = 1 MHz
10FWJ2CZ47M	30	10	100	–40 to 125	–40 to 150	3.5	0.47	5.0	290	V_R = 10 V, f = 1 MHz
10GWJ2CZ47C	40	10	100	–40 to 125	–40 to 150	3.5	0.55	5.0	195	V_R = 10 V, f = 1 MHz
20FWJ2CZ47M	30	20	200	–40 to 125	–40 to 150	10	0.47	10	680	V_R = 10 V, f = 1 MHz
30FWJ2CZ47M	30	30	300	–40 to 125	–40 to 150	15	0.47	15	820	V_R = 10 V, f = 1 MHz
30GWJ2CZ47C	40	30	300	–40 to 125	–40 to 150	15	0.55	15	600	V_R = 10 V, f = 1 MHz
30QWK2CZ47	120	30	250	–40 to 150	–40 to 150	0.05	0.85	15	227	V_R = 10 V, f = 1 MHz

TO-220FL

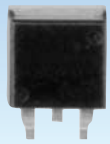
Package Appearance	Package Dimensions (mm)	Marking
Package Number ⑦		Typical  Laser Mark

Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	$I_{o(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (mA)	V_{FM} (V)	@I_{FM} (A)	C_j (pF)(Typ.)	Cond.
5FWJ2C48M	30	5.0	50	–40 to 125	–40 to 150	3.5	0.47	2.5	138	V_R =10V, f=1MHz
5GWJ2C48C	40	5.0	50	–40 to 125	–40 to 150	3.5	0.55	2.5	100	V_R =10V, f=1MHz
10FWJ2C48M	30	10	100	–40 to 125	–40 to 150	3.5	0.47	5.0	290	V_R =10V, f=1MHz
10GWJ2C48C	40	10	100	–40 to 125	–40 to 150	3.5	0.55	5.0	195	V_R =10V, f=1MHz
20FWJ2C48M	30	20	200	–40 to 125	–40 to 150	10	0.47	10	680	V_R =10V, f=1MHz
30FWJ2C48M	30	30	300	–40 to 125	–40 to 150	15	0.47	15	820	V_R =10V, f=1MHz
30GWJ2C48C	40	30	300	–40 to 125	–40 to 150	15	0.55	15	600	V_R =10V, f=1MHz
30QWK2C48	120	30	250	–40 to 150	–40 to 150	0.05	0.85	15	227	V_R =10V, f=1MHz

Center-tap

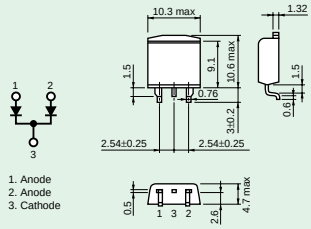
TO-220SM

Package Appearance



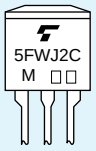
Package Number (21)

Package Dimensions (mm)



Marking

Typical



Laser Mark

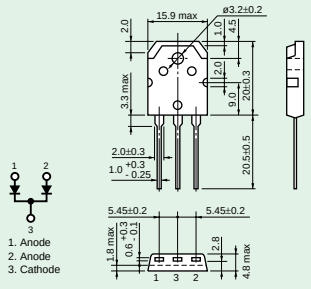
Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	I_O (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (mA)	V_{FM} (V)	@I_{FM} (A)	C_j (pF)(Typ.)	Cond.
U5FWJ2C48M	30	5.0	50	–40 to 125	–40 to 150	3.5	0.47	2.5	138	V_R = 10 V, f = 1 MHz
U5GWJ2C48C	40	5.0	50	–40 to 125	–40 to 150	3.5	0.55	2.5	100	V_R = 10 V, f = 1 MHz
U10FWJ2C48M	30	10	100	–40 to 125	–40 to 150	3.5	0.47	5.0	290	V_R = 10 V, f = 1 MHz
U10GWJ2C48C	40	10	100	–40 to 125	–40 to 150	3.5	0.55	5.0	195	V_R = 10 V, f = 1 MHz
U20FWJ2C48M	30	20	200	–40 to 125	–40 to 150	10	0.47	10	680	V_R = 10 V, f = 1 MHz
U30FWJ2C48M	30	30	300	–40 to 125	–40 to 150	15	0.47	15	820	V_R = 10 V, f = 1 MHz
U30GWJ2C48C	40	30	300	–40 to 125	–40 to 150	15	0.55	15	600	V_R = 10 V, f = 1 MHz

TO-3P(N)

Package Appearance

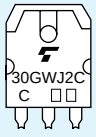
Package Number (10)

Package Dimensions (mm)



Marking

Typical



Color: White

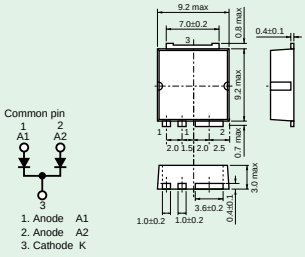
Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	I_O (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (mA)	V_{FM} (V)	@I_{FM} (A)	C_j (pF)(Typ.)	Cond.
30GWJ2C42C	40	30	300	–40 to 125	–40 to 150	15	0.55	15	600	V_R = 10 V, f = 1 MHz

TFP

Package Appearance

Package Number (22)

Package Dimensions (mm)



Marking

Typical

Laser Mark

Part Number	Maximum Ratings					Electrical Characteristics				
	V_{RRM} (V)	I_O (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (mA)	V_{FM} (V)	@I_{FM}(A)	C_j (pF)(Typ.)	Cond.
U30FWJ2C53M	30	30	300	–40 to 125	–40 to 150	15	0.47	15	880	V_R = 10 V, f = 1 MHz
U30GWJ2C53C	40	30	300	–40 to 125	–40 to 150	15	0.55	15	660	V_R = 10 V, f = 1 MHz
U30QWK2C53	120	30	100	–40 to 150	–40 to 150	0.05	0.85	15	230	V_R = 10 V, f = 1 MHz

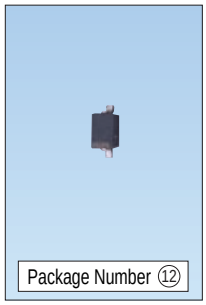
5.4 Power Zener Diodes

U02Z300N Series (SMD)

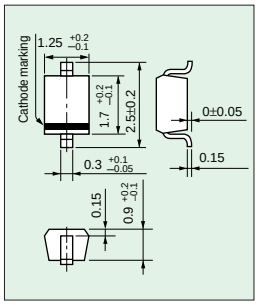
Maximum Ratings (Ta = 25˚C)

Characteristic	Symbol	Rating	Unit
Power Dissipation	P	200	mW
Junction Temperature	T_j	150	˚C
Storage Temperature	T_{stg}	−55 to 150	˚C

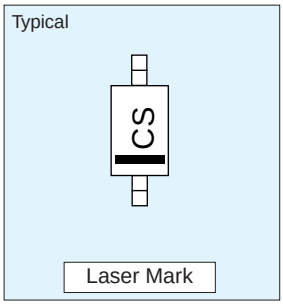
Package Appearance



Package Dimensions (mm)



Marking



Electrical Characteristics (Ta = 25˚C)

Part Number	Zener Characteristics					Temperature Coefficient of Zener Voltage αT (mV/˚C)		Forward Voltage V_F (V)		Reverse Current I_R (μA)		Marking
	Zener voltage V_Z (V)			Zener impedance rd (Ω)	Measurement current I_Z (mA)				Measurement Current I_F (mA)		Measurement voltage V_R (V)	
	Min	Typ.	Max	Max		Typ.	Max	Max		Max		
U02Z300N	270	300	330	10	0.1	240	400	1.2	10	1	240	CS
U02Z300N-L	270	280	290	10	0.1	220	360	1.2	10	1	240	CL
U02Z300N-X	280	290	300	10	0.1	230	370	1.2	10	1	240	CX
U02Z300N-Y	290	300	310	10	0.1	240	380	1.2	10	1	240	CY
U02Z300N-Z	300	310	320	10	0.1	250	390	1.2	10	1	240	CZ
U02Z300N-H	310	320	330	10	0.1	260	400	1.2	10	1	240	CH

CRY62, CRZ10 Series (SMD)

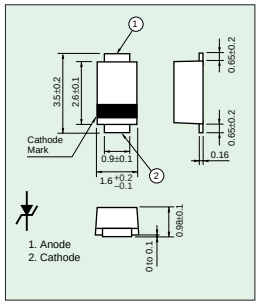
Maximum Ratings

Characteristic	Symbol	Rating	Unit
Power Dissipation	P	700	mW
Junction Temperature	Tj	150	˚C
Storage Temperature	Tstg	-40 to 150	˚C

Package Appearance

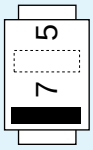
Package Number ⑭

Package Dimensions (mm)



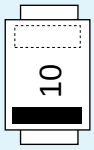
Marking

Typical CRY62 to CRY91



Laser Mark

Typical CRZ10 to CRZ47



Laser Mark

Electrical Characteristics (Ta = 25˚C)

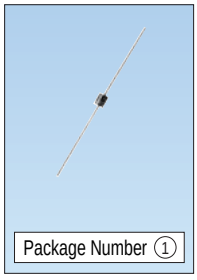
Part Number	Zener Characteristics					Temperature Coefficient of Zener Voltage αT (mV/˚C)		Forward Voltage VF (V)		Reverse Current IR (μA)	
	Zener voltage VZ (V)			Zener impedance rd (Ω)	Measurement current IZ (mA)				Measurement Current IF (A)		Measurement voltage VR (V)
	Min	Typ.	Max	Max		Typ.	Max	Max		Max	
CRY62	5.6	6.2	6.8	60	10	2	3	1.0	0.2	10	3.0
CRY68	6.2	6.8	7.4	60	10	3	4	1.0	0.2	10	3.0
CRY75	6.8	7.5	8.3	30	10	4	5	1.0	0.2	10	4.5
CRY82	7.4	8.2	9.0	30	10	4	6	1.0	0.2	10	4.9
CRY91	8.2	9.1	10.0	30	10	5	8	1.0	0.2	10	5.5
CRZ10	9.0	10.0	11.0	30	10	6	9	1.0	0.2	10	6.0
CRZ11	9.9	11.0	12.1	30	10	7	11	1.0	0.2	10	7.0
CRZ12	10.8	12.0	13.2	30	10	8	13	1.0	0.2	10	8.0
CRZ13	11.7	13.0	14.3	30	10	9	14	1.0	0.2	10	9.0
CRZ15	13.5	15.0	16.5	30	10	11	17	1.0	0.2	10	10.0
CRZ16	14.4	16.0	17.6	30	10	12	19	1.0	0.2	10	11.0
CRZ18	16.2	18.0	19.8	30	10	14	23	1.0	0.2	10	13.0
CRZ20	18.0	20.0	22.0	30	10	16	26	1.0	0.2	10	14.0
CRZ22	19.8	22.0	24.2	30	10	18	28	1.0	0.2	10	16.0
CRZ24	21.6	24.0	26.4	30	10	20	32	1.0	0.2	10	17.0
CRZ27	24.3	27.0	29.7	30	10	23	36	1.0	0.2	10	19.0
CRZ30	27.0	30.0	33.0	30	10	25	40	1.0	0.2	10	21.0
CRZ33	29.7	33.0	36.3	30	10	26	41	1.0	0.2	10	26.4
CRZ36	32.4	36.0	39.6	30	9	28	45	1.0	0.2	10	28.8
CRZ39	35.1	39.0	42.9	35	8	30	48	1.0	0.2	10	31.2
CRZ43	38.7	43.0	47.3	40	7	33	53	1.0	0.2	10	34.4
CRZ47	42.3	47.0	51.7	65	6	38	60	1.0	0.2	10	37.6

1ZB6.8 Series

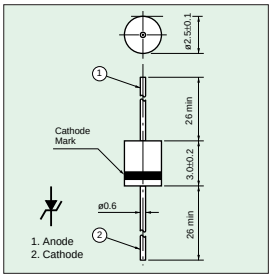
Maximum Ratings

Characteristic	Symbol	Rating	Unit
Power Dissipation	P	1.0	W
Junction Temperature	T_j	150	˚C
Storage Temperature	T_{stg}	−40 to 150	˚C

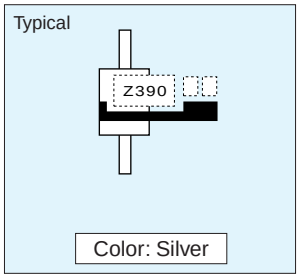
Package Appearance



Package Dimensions (mm)



Marking



Electrical Characteristics (Ta = 25˚C)

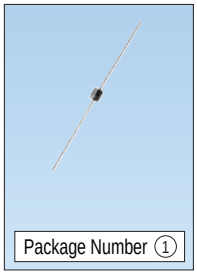
Part Number	Zener Characteristics					Temperature Coefficient of Zener Voltage αT (mV/˚C)		Forward Voltage V_F (V)	Measurement Current I_F (A)	Reverse Current I_R (μA)	Measurement voltage V_R (V)
	Zener voltage V_Z (V)			Zener impedance rd (Ω)	Measurement current I_Z (mA)						
	Min	Typ.	Max	Max		Typ.	Max	Max		Max	
1ZB6.8	6.2	6.8	7.4	60	10	3	4	1.2	0.2	10	3
1ZB7.5	6.8	7.5	8.3	30	10	4	5	1.2	0.2	10	4.5
1ZB8.2	7.4	8.2	9.1	30	10	4	6	1.2	0.2	10	4.9
1ZB9.1	8.2	9.1	10.1	30	10	5	8	1.2	0.2	10	5.5
1ZB10	9.0	10	11.0	30	10	6	9	1.2	0.2	10	6
1ZB11	9.9	11	12.1	30	10	7	11	1.2	0.2	10	7
1ZB12	10.8	12	13.2	30	10	8	13	1.2	0.2	10	8
1ZB13	11.7	13	14.3	30	10	9	14	1.2	0.2	10	9
1ZB15	13.5	15	16.5	30	10	11	17	1.2	0.2	10	10
1ZB16	14.4	16	17.6	30	10	12	19	1.2	0.2	10	11
1ZB18	16.2	18	19.8	30	10	14	23	1.2	0.2	10	13
1ZB20	18.0	20	22.0	30	10	16	26	1.2	0.2	10	14
1ZB22	19.8	22	24.2	30	10	18	28	1.2	0.2	10	16
1ZB24	21.6	24	26.4	30	10	20	30	1.2	0.2	10	17
1ZB27	24.3	27	29.7	30	10	23	36	1.2	0.2	10	19
1ZB30	27.0	30	33.0	30	10	25	40	1.2	0.2	10	21
1ZB33	29.7	33	36.3	30	10	26	41	1.2	0.2	10	26.4
1ZB36	32.4	36	39.6	30	9	28	45	1.2	0.2	10	28.8
1ZB43	38.7	43	47.3	40	7	33	53	1.2	0.2	10	34.4
1ZB47	42.3	47	51.7	65	6	38	60	1.2	0.2	10	37.6
1ZB51	45.9	51	56.1	65	6	43	68	1.2	0.2	10	40.8
1ZB68	61.2	68	74.8	120	4	57	90	1.2	0.2	10	54.4
1ZB75	67.5	75	82.5	150	4	66	104	1.2	0.2	10	60
1ZB82	73.8	82	90.2	170	3	71	113	1.2	0.2	10	65.4
1ZB100	90	100	110	300	3	87	138	1.2	0.2	10	80
1ZB110	99	110	121	300	3	96	152	1.2	0.2	10	88
1ZB150	135	150	165	450	2	136	212	1.2	0.2	10	120
1ZB180	162	180	198	500	1.5	161	255	1.2	0.2	10	144
1ZB200	180	200	220	500	1.5	170	269	1.2	0.2	10	160
1ZB200-Y	190	200	210			170	269				160
1ZB200-Z	200	210	220			178	286				168
1ZB220	198	220	242	5000	0.5	200	309	1.2	0.2	10	176
1ZB220-Y	210	220	230			200	309				176
1ZB220-Z	220	230	240			207	320				184
1ZB240	216	240	264	5000	0.5	215	343	1.2	0.2	10	192
1ZB240-Y	230	240	250			215	343				216
1ZB240-Z	240	250	260			225	338				225
1ZB270	243	270	297	5000	0.5	243	385	1.2	0.2	10	216
1ZB270-X	250	260	270			221	350				234
1ZB270-Y	260	270	280			228	362				243
1ZB270-Z	270	280	290			236	374				252
1ZB300	270	300	330	5000	0.5	270	428	1.2	0.2	10	240
1ZB300-X	280	290	300			244	388				261
1ZB300-Y	290	300	310			253	402				270
1ZB300-Z	300	310	320			261	415				279
1ZB330	297	330	363	5000	0.5	296	470	1.2	0.2	10	264
1ZB330-X	310	320	330			270	428				288
1ZB330-Y	320	330	340			278	441				297
1ZB330-Z	330	340	350			287	445				306
1ZB390	351	390	429	10000	0.5	350	555	1.2	0.2	10	312

1ZC12 Series / 1ZC12A Series

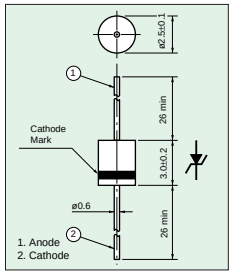
Maximum Ratings

Characteristic	Symbol	Rating	Unit
Power Dissipation	P	1.0	W
Junction Temperature	Tj	150	˚C
Storage Temperature	Tstg	−40 to 150	˚C

Package Appearance

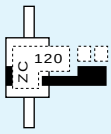


Package Dimensions (mm)



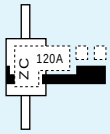
Marking

Typical 1ZC12 Series



Color: Silver

Typical 1ZC12A Series



Color: Silver

Electrical Characteristics (Ta = 25˚C)

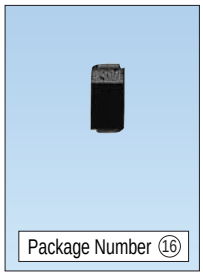
Part Number	Zener Characteristics					Temperature Coefficient of Zener Voltage αT (mV/˚C)		Forward Voltage VF (V)		Reverse Current IR (μA)	
	Zener voltage Vz (V)			Zener impedance rd (Ω)	Measurement current Iz (mA)				Measurement Current IF (A)		Measurement voltage VR (V)
	Min	Typ.	Max	Max		Typ.	Max	Max		Max	
1ZC12	10.8	12	13.2	30	10	8	13	1.2	0.2	10	8.0
1ZC12A	11.4	12	12.6	30	10	8	13	1.2	0.2	10	8.0
1ZC13	11.7	13	14.3	30	10	9	14	1.2	0.2	10	9.0
1ZC13A	12.4	13	13.6	30	10	9	14	1.2	0.2	10	9.0
1ZC15	13.5	15	16.5	30	10	11	17	1.2	0.2	10	10.0
1ZC15A	14.3	15	15.8	30	10	11	17	1.2	0.2	10	10.0
1ZC16	14.4	16	17.6	30	10	12	19	1.2	0.2	10	11.0
1ZC16A	15.2	16	16.8	30	10	12	19	1.2	0.2	10	11.0
1ZC18	16.2	18	19.8	30	10	14	23	1.2	0.2	10	13.0
1ZC18A	17.1	18	18.9	30	10	14	23	1.2	0.2	10	13.0
1ZC20	18.0	20	22.0	30	10	16	26	1.2	0.2	10	14.0
1ZC20A	19.0	20	21.0	30	10	16	26	1.2	0.2	10	14.0
1ZC22	19.8	22	24.2	30	10	18	28	1.2	0.2	10	16.0
1ZC22A	20.9	22	23.1	30	10	18	28	1.2	0.2	10	16.0
1ZC24	21.6	24	26.4	30	10	20	32	1.2	0.2	10	17.0
1ZC24A	22.8	24	25.2	30	10	20	32	1.2	0.2	10	17.0
1ZC27	24.3	27	29.7	30	10	23	36	1.2	0.2	10	19.0
1ZC27A	25.7	27	28.3	30	10	23	36	1.2	0.2	10	19.0
1ZC30	27.0	30	33.0	30	10	25	40	1.2	0.2	10	21.0
1ZC30A	28.5	30	31.5	30	10	25	40	1.2	0.2	10	21.0
1ZC33	29.7	33	36.3	30	10	26	41	1.2	0.2	10	26.4
1ZC33A	31.4	33	34.6	30	10	26	41	1.2	0.2	10	26.4
1ZC36	32.4	36	39.6	30	9	28	45	1.2	0.2	10	28.8
1ZC36A	34.2	36	37.8	30	9	28	45	1.2	0.2	10	28.8
1ZC39	35.1	39	42.9	35	8	30	48	1.2	0.2	10	31.2
1ZC39A	37.1	39	40.9	35	8	30	48	1.2	0.2	10	31.2
1ZC43	38.7	43	47.3	40	7	33	53	1.2	0.2	10	34.4
1ZC43A	40.9	43	45.1	40	7	33	53	1.2	0.2	10	34.4
1ZC47	42.3	47	51.7	65	6	38	60	1.2	0.2	10	37.6
1ZC47A	44.7	47	49.3	65	6	38	60	1.2	0.2	10	37.6
1ZC51	45.9	51	56.1	65	6	43	68	1.2	0.2	10	40.8
1ZC51A	48.5	51	53.5	65	6	43	68	1.2	0.2	10	40.8
1ZC56	50.4	56	61.6	85	5	48	77	1.2	0.2	10	44.8
1ZC56A	53.2	56	58.8	85	5	48	77	1.2	0.2	10	44.8
1ZC62	55.8	62	68.2	105	5	53	85	1.2	0.2	10	49.6
1ZC62A	58.9	62	65.1	105	5	53	85	1.2	0.2	10	49.6
1ZC68	61.2	68	74.8	120	4	57	90	1.2	0.2	10	54.4
1ZC68A	64.6	68	71.4	120	4	57	90	1.2	0.2	10	54.4
1ZC75	67.5	75	82.5	150	4	66	104	1.2	0.2	10	60
1ZC75A	71.3	75	78.7	150	4	66	104	1.2	0.2	10	60
1ZC82	73.8	82	90.2	170	3	71	113	1.2	0.2	10	65.4
1ZC82A	77.9	82	86.1	170	3	71	113	1.2	0.2	10	65.4
1ZC91	81.9	91	100.1	240	3	79	127	1.2	0.2	10	72.8
1ZC91A	86.5	91	95.5	240	3	79	127	1.2	0.2	10	72.8
1ZC100	90.0	100	110.0	300	3	87	138	1.2	0.2	10	80
1ZC100A	95.0	100	105.0	300	3	87	138	1.2	0.2	10	80
1ZC110	99.0	110	121.0	300	3	96	52	1.2	0.2	10	88
1ZC110A	104.5	110	115.5	300	3	96	152	1.2	0.2	10	88
1ZC120	108.0	120	132.0	350	2.5	106	170	1.2	0.2	10	96
1ZC120A	114.0	120	126.0	350	2.5	106	171	1.2	0.2	10	96

U1ZB6.8 Series (SMD)

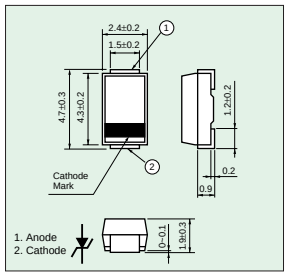
Maximum Ratings

Characteristic	Symbol	Rating	Unit
Power Dissipation	P	1.0	W
Junction Temperature	Tj	150	˚C
Storage Temperature	Tstg	−40 to 150	˚C

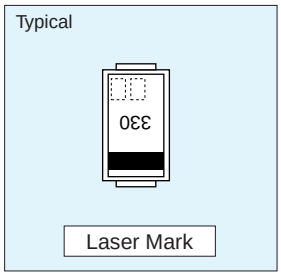
Package Appearance



Package Dimensions (mm)



Marking



Electrical Characteristics (Ta = 25˚C)

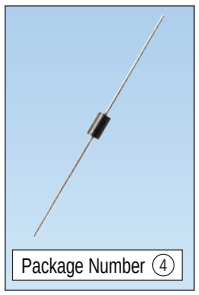
Part Number	Zener Characteristics					Temperature Coefficient of Zener Voltage αT (mV/˚C)		Forward Voltage VF (V)	Measurement Current IF (A)	Reverse Current IR (μA)	Measurement voltage VR (V)
	Zener voltage VZ (V)			Zener impedance rd (Ω)	Measurement current IZ (mA)						
	Min	Typ.	Max	Max		Typ.	Max	Max		Max	
U1ZB6.8	6.2	6.8	7.4	60	10	3	4	1.2	0.2	10	3
U1ZB7.5	6.8	7.5	8.3	30	10	4	5	1.2	0.2	10	4.5
U1ZB8.2	7.4	8.2	9.1	30	10	4	6	1.2	0.2	10	4.9
U1ZB9.1	8.2	9.1	10.1	30	10	5	8	1.2	0.2	10	5.5
U1ZB10	9.0	10	11.0	30	10	6	9	1.2	0.2	10	6
U1ZB11	9.9	11	12.1	30	10	7	11	1.2	0.2	10	7
U1ZB12	10.8	12	13.2	30	10	8	13	1.2	0.2	10	8
U1ZB13	11.7	13	14.3	30	10	9	14	1.2	0.2	10	9
U1ZB15	13.5	15	16.5	30	10	11	17	1.2	0.2	10	10
U1ZB16	14.4	16	17.6	30	10	12	19	1.2	0.2	10	11
U1ZB18	16.2	18	19.8	30	10	14	23	1.2	0.2	10	13
U1ZB20	18.0	20	22.0	30	10	16	26	1.2	0.2	10	14
U1ZB22	19.8	22	24.2	30	10	18	28	1.2	0.2	10	16
U1ZB24	21.6	24	26.4	30	10	20	30	1.2	0.2	10	17
U1ZB27	24.3	27	29.7	30	10	23	36	1.2	0.2	10	19
U1ZB30	27.0	30	33.0	30	10	25	40	1.2	0.2	10	21
U1ZB33	29.7	33	36.3	30	10	26	41	1.2	0.2	10	26.4
U1ZB36	32.4	36	39.6	30	9	28	45	1.2	0.2	10	28.8
U1ZB43	38.7	43	47.3	40	7	33	53	1.2	0.2	10	34.4
U1ZB47	42.3	47	51.7	65	6	38	60	1.2	0.2	10	37.6
U1ZB51	45.9	51	56.1	65	6	43	68	1.2	0.2	10	40.8
U1ZB68	61.2	68	74.8	120	4	57	90	1.2	0.2	10	54.4
U1ZB75	67.5	75	82.5	150	4	66	104	1.2	0.2	10	60
U1ZB82	73.8	82	90.2	170	3	71	113	1.2	0.2	10	65.4
U1ZB100	90	100	110	300	3	87	138	1.2	0.2	10	80
U1ZB110	99	110	121	300	3	96	152	1.2	0.2	10	88
U1ZB150	135	150	165	450	2	136	212	1.2	0.2	10	120
U1ZB180	162	180	198	500	1.5	161	255	1.2	0.2	10	44
U1ZB200	180	200	220			170	269				160
U1ZB200-Y	190	200	210	500	1.5	170	269	1.2	0.2	10	160
U1ZB200-Z	200	210	220			178	286				68
U1ZB220	198	220	242			200	309				176
U1ZB220-Y	210	220	230	5000	0.5	200	309	1.2	0.2	10	176
U1ZB220-Z	220	230	240			207	320				184
U1ZB240	216	240	264			215	343				192
U1ZB240-Y	230	240	250	5000	0.5	215	343	1.2	0.2	10	216
U1ZB240-Z	240	250	260			225	338				225
U1ZB270	243	270	297			243	385				216
U1ZB270-X	250	260	270	5000	0.5	221	350	1.2	0.2	10	234
U1ZB270-Y	260	270	280			228	362				243
U1ZB270-Z	270	280	290			236	374				252
U1ZB300	270	300	330			270	428				240
U1ZB300-X	280	290	300	5000	0.5	244	388	1.2	0.2	10	261
U1ZB300-Y	290	300	310			253	402				270
U1ZB300-Z	300	310	320			261	415				279
U1ZB330	297	330	363			296	470				264
U1ZB330-X	310	320	330	5000	0.5	270	428	1.2	0.2	10	288
U1ZB330-Y	320	330	340			278	441				297
U1ZB330-Z	330	340	350			287	445				306
U1ZB390	351	390	429	10000	0.5	350	555	1.2	0.2	10	312

1Z6.2, 1Z6.8A Series

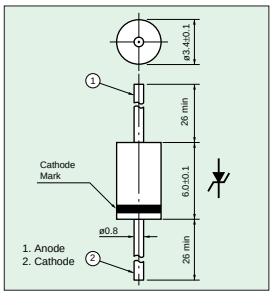
Maximum Ratings

Characteristic	Symbol	Rating	Unit
Power Dissipation	P	1.0	W
Junction Temperature	Tj	150	˚C
Storage Temperature	Tstg	-40 to 150	˚C

Package Appearance



Package Dimensions (mm)



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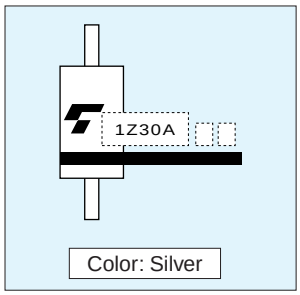


Electrical Characteristics (Ta = 25˚C)

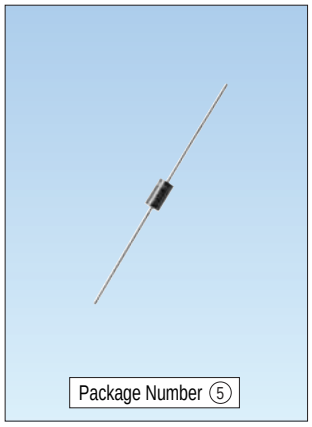
Part Number	Zener Characteristics					Temperature Coefficient of Zener Voltage αT (mV/˚C)		Forward Voltage VF (V)		Reverse Current IR (μA)	
	Zener voltage VZ (V)			Zener impedance rd (Ω)	Measurement current IZ (mA)				Measurement Current IF (A)		Measurement voltage VR (V)
	Min	Typ.	Max	Max		Typ.	Max	Max		Max	
1Z6.2	5.6	6.2	6.8	60	10	1.5	2	1.2	0.2	10	2
1Z6.8	6.2	6.8	7.4	60	10	3	4	1.2	0.2	10	3
1Z6.8A	6.45	6.8	7.14								
1Z7.5	6.8	7.5	8.3	30	10	4	5	1.2	0.2	10	4.5
1Z7.5A	7.13	7.5	7.87								
1Z8.2	7.4	8.2	9.1	30	10	4	6	1.2	0.2	10	4.9
1Z8.2A	7.79	8.2	8.61								
1Z9.1	8.2	9.1	10.1	30	10	5	8	1.2	0.2	10	5.5
1Z9.1A	8.65	9.1	9.55								
1Z10	9.0	10	11.0	30	10	6	9	1.2	0.2	10	6
1Z10A	9.5	10	10.5								
1Z11	9.9	11	12.1	30	10	7	11	1.2	0.2	10	7
1Z11A	10.5	11	11.5								
1Z12	10.8	12	13.2	30	10	8	13	1.2	0.2	10	8
1Z12A	11.4	12	12.6								
1Z13	11.7	13	14.3	30	10	9	14	1.2	0.2	10	9
1Z13A	12.4	13	13.6								
1Z15	13.5	15	16.5	30	10	11	17	1.2	0.2	10	10
1Z15A	14.3	15	15.8								
1Z16	14.4	16	17.6	30	10	12	19	1.2	0.2	10	11
1Z16A	15.2	16	16.8								
1Z18	16.2	18	19.8	30	10	14	23	1.2	0.2	10	13
1Z18A	17.1	18	18.9								
1Z20	18.0	20	22.0	30	10	16	26	1.2	0.2	10	14
1Z20A	19.0	20	21.0								
1Z22	19.8	22	24.2	30	10	18	28	1.2	0.2	10	16
1Z22A	20.9	22	23.1								
1Z24	21.6	24	26.4	30	10	20	32	1.2	0.2	10	17
1Z24A	22.8	24	25.2								
1Z27	24.3	27	29.7	30	10	23	36	1.2	0.2	10	19
1Z27A	25.7	27	28.3								
1Z30	27.0	30	33.0	30	10	25	40	1.2	0.2	10	21
1Z30A	28.5	30	31.5								
1Z33	29.7	33	36.3	30	10	26	41	1.2	0.2	10	26.4
1Z36	32.4	36	39.6	30	9	28	45	1.2	0.2	10	28.8
1Z43	38.7	43	47.3	40	7	33	53	1.2	0.2	10	34.4
1Z47	42.3	47	51.7	65	6	38	60	1.2	0.2	10	37.6
1Z51	45.9	51	56.1	65	6	43	68	1.2	0.2	10	40.8
1Z68	61.2	68	74.8	120	4	57	90	1.2	0.2	10	54.4
1Z75	67.5	75	82.5	150	4	66	104	1.2	0.2	10	60
1Z82	73.8	82	90.2	170	3	71	113	1.2	0.2	10	65.4
1Z100	90	100	110	300	3	87	138	1.2	0.2	10	80
1Z110	99	110	121	300	3	96	152	1.2	0.2	10	88
1Z150	135	150	165	450	2	136	212	1.2	0.2	10	120
1Z180	162	180	198	500	1.5	161	255	1.2	0.2	10	144
1Z330	297	330	363	5000	1.0	297	472	1.2	0.2	10	264
1Z390	351	390	429	10000	0.5	350	555	1.2	0.2	10	312

2Z12, 2Z16A Series

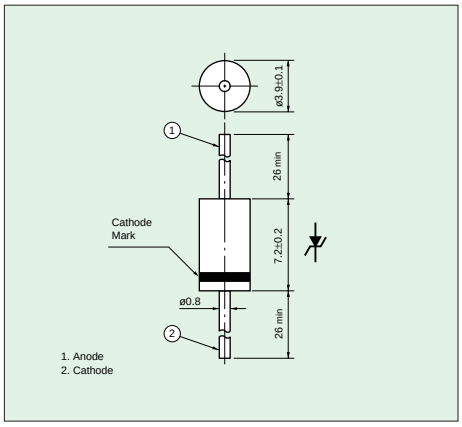
Maximum Ratings

Characteristic	Symbol	Rating	Unit
Power Dissipation	P	1.5	W
Junction Temperature	T_j	150	˚C
Storage Temperature	T_{stg}	−40 to 150	˚C

Package Appearance



Package Dimensions (mm)



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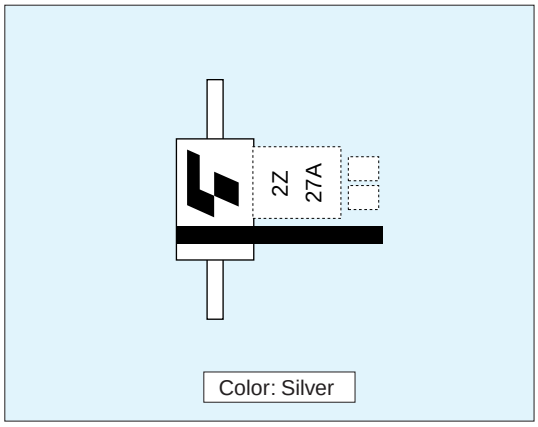


Electrical Characteristics (Ta = 25˚C)

Part Number	Zener Characteristics					Temperature Coefficient of Zener Voltage αT (mV/˚C)		Forward Voltage V_F (V)	Measurement Current I_F (A)	Reverse Current I_R (μA)	Measurement voltage V_R (V)
	Zener voltage V_Z (V)			Zener impedance rd (Ω)	Measurement current I_Z (mA)						
	Min	Typ.	Max	Typ.		Typ.	Max	Max		Max	
2Z12	10.8	12	13.2	30	10	8	13	1.2	0.2	5	10.2
2Z13	1.7	13	14.3	30	10	9	14	1.2	0.2	5	11.1
2Z15	13.5	15	16.5	30	10	11	17	1.2	0.2	5	12.8
2Z16	14.4	16	17.6	30	10	12	19	1.2	0.2	5	13.6
✻ **2Z16A**	15.2	16	16.8	30	10	12	19	1.2	0.2	5	13.6
2Z18	16.2	18	19.8	30	10	14	23	1.2	0.2	5	15.3
✻ **2Z18A**	17.1	18	18.9	30	10	14	23	1.2	0.2	5	15.3
2Z20	18.0	20	22.0	30	10	16	26	1.2	0.2	5	17.1
2Z22	19.8	22	24.2	30	10	18	28	1.2	0.2	5	18.8
2Z24	21.6	24	26.4	30	10	20	32	1.2	0.2	5	20.5
2Z27	24.3	27	29.7	30	10	23	36	1.2	0.2	5	23.1
✻ **2Z27A**	25.7	27	28.3	30	10	23	36	1.2	0.2	5	23.1
2Z30	27.0	30	33.0	30	10	25	40	1.2	0.2	5	25.6
2Z33	29.7	33	36.3	30	10	26	41	1.2	0.2	5	28.2
2Z36	32.4	36	39.6	30	9	28	45	1.2	0.2	5	30.8
2Z47	42.3	47	51.7	65	6	38	60	1.2	0.2	5	40.2
2Z51	45.9	51	56.1	65	6	43	68	1.2	0.2	5	43.6

✻: This product is manufactured to order only.

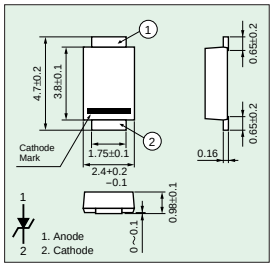
CMZ12 Series (SMD)

Maximum Ratings

Characteristic	Symbol	Rating	Unit
Power Dissipation	P	2	W
Junction Temperature	Tj	150	˚C
Storage Temperature	Tstg	−40 to 150	˚C

Package Appearance

Package Dimensions (mm)



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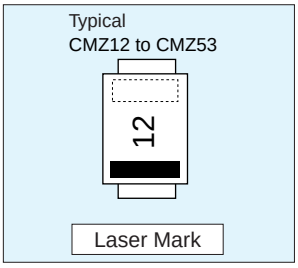


Electrical Characteristics (Ta = 25˚C)

Part Number	Zener Characteristics					Temperature Coefficient of Zener Voltage αT (mV/˚C)		Forward Voltage VF (V)		Reverse Current IR (μA)	
	Zener voltage Vz (V)			Zener impedance rd (Ω)	Measurement current Iz (mA)				Measurement Current IF (A)		Measurement voltage VR (V)
	Min	Typ.	Max	Max		Typ.	Max	Max		Max	
CMZ12	10.8	12	13.2	30	10	-	13	1.2	0.2	10	8
CMZ13	11.7	13	14.3	30	10	-	14	1.2	0.2	10	9
CMZ15	13.5	15	16.5	30	10	-	17	1.2	0.2	10	10
CMZ16	14.4	16	17.6	30	10	-	19	1.2	0.2	10	11
CMZ18	16.2	18	19.8	30	10	-	23	1.2	0.2	10	13
CMZ20	18.0	20	22.0	30	10	-	26	1.2	0.2	10	14
CMZ22	19.8	22	24.2	30	10	-	28	1.2	0.2	10	16
CMZ24	21.6	24	26.4	30	10	-	32	1.2	0.2	10	17
CMZ27	24.3	27	29.7	30	10	-	36	1.2	0.2	10	19
CMZ30	27.0	30	33.0	30	10	-	40	1.2	0.2	10	21
CMZ33	29.7	33	36.3	30	10	-	41	1.2	0.2	10	26.4
CMZ36	32.4	36	39.6	30	9	-	45	1.2	0.2	10	28.8
CMZ39	35.1	39	42.9	35	8	-	48	1.2	0.2	10	31.2
CMZ43	38.7	43	47.3	40	7	-	53	1.2	0.2	10	34.4
CMZ47	42.3	47	51.7	65	6	-	60	1.2	0.2	10	37.6
CMZ51	45.9	51	56.1	65	6	-	68	1.2	0.2	10	40.8
CMZ53	47.7	53	58.3	85	5	-	77	1.2	0.2	10	42.4

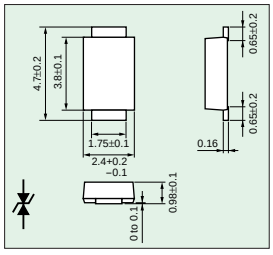
CMZM16 Series (SMD) Bi-directional Zener Diodes

Maximum Ratings

Characteristic	Symbol	Rating	Unit
Power Dissipation	P	1.0	W
Junction Temperature	Tj	150	˚C
Storage Temperature	Tstg	-40 to 150	˚C

Package Appearance

Package Dimensions (mm)



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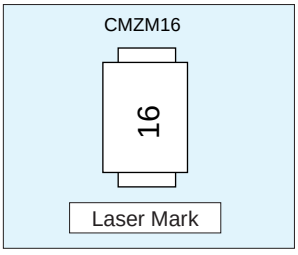


Electrical Characteristics (Ta = 25˚C)

Part Number	Zener Characteristics					Temperature Coefficient of Zener Voltage αT (mV/˚C)		Reverse Current IR (μA)	
	Zener voltage Vz (V)			Zener impedance rd (Ω)	Measurement current Iz (mA)				Measurement voltage VR (V)
	Min	Typ.	Max	Max		Typ.	Max	Max	
CMZM16	14.4	16	17.6	30	10	–	19	10	11

U5ZA27(Z), U5ZA27C, U5ZA40C, U5ZA48C, U5ZA53C(SMD) Series

Maximum Ratings

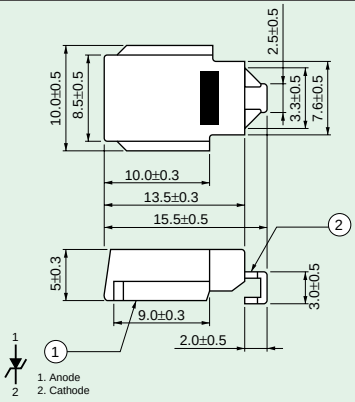
Characteristic	Symbol		Rating	Unit
Power Dissipation (Note1)	P		5.0	W
Non-Repetitive Peak Reverse Surge Current (see Figure 2.)	I_{RSM}	**U5ZA27(Z)**	62	A
		U5ZA27C		
		U5ZA40C		
		U5ZA48C	50	
		U5ZA53C	45	
Junction Temperature	T_j		150	˚C
Storage Temperature	T_{stg}		−40 to 150	˚C

Note 1: T_L = 25˚C

Package Appearance

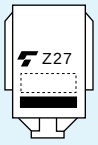
Package Number ㉓

Package Dimensions (mm)



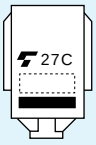
Marking

U5ZA27(Z)



Laser Mark

U5ZA27C

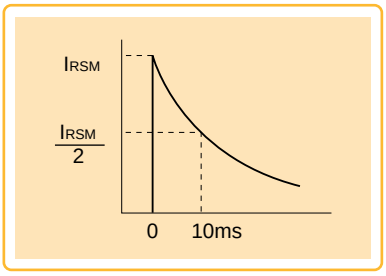


Abbreviation	Part No.
40C	**U5ZA40C**
48C	**U5ZA48C**
53C	**U5ZA53C**

Laser Mark

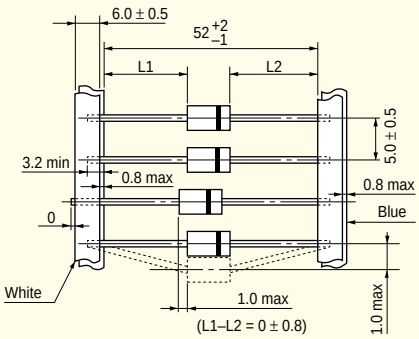
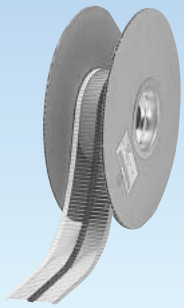
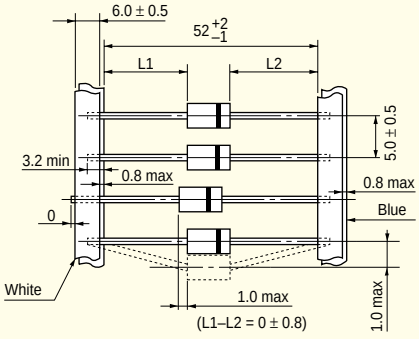
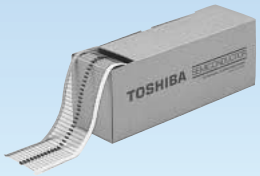
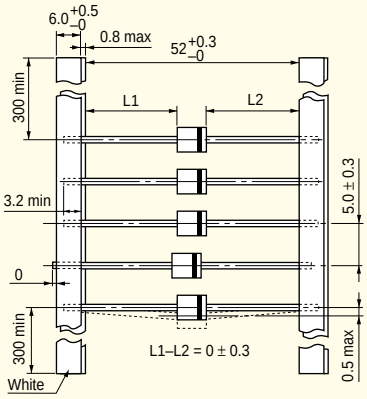
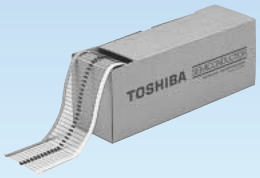
Electrical Characteristics (Ta = 25˚C)

Part Number	Zener Characteristics					Temperature Coefficient of Zener Voltage αT (mV/˚C)		Forward Voltage V_F (V)	Measurement Current I_F (A)	Reverse Current I_R (μA)	Measurement voltage V_R (V)
	Zener voltage V_Z (V)			Zener impedance rd (Ω)	Measurement current I_Z (mA)						
	Min	Typ.	Max	Max		Typ.	Max	Max		Max	
U5ZA27(Z)	24	27	30	30	10	23	36	1.2	6	10	22
U5ZA27C	24	27	30	30	10	23	36	1.2	6	10	22
U5ZA40C	36	40	44	30	10	31	49	1.2	6	10	32
U5ZA48C	43.2	48	52.8	65	10	39	62	1.2	6	10	38.4
U5ZA53C	47.7	53	58.3	65	10	45	70	1.2	6	10	42.4

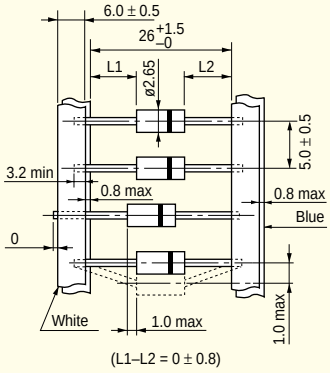
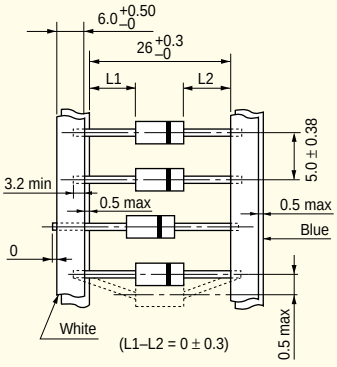
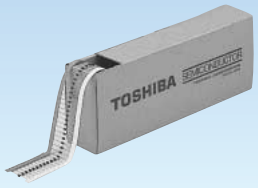
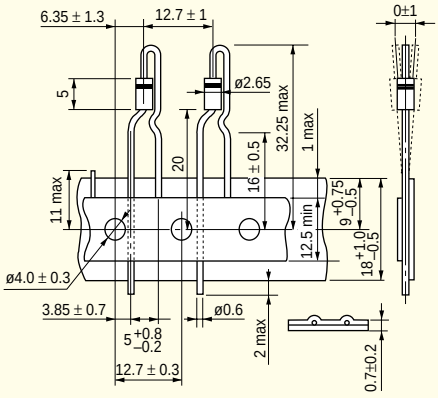
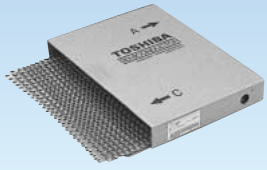
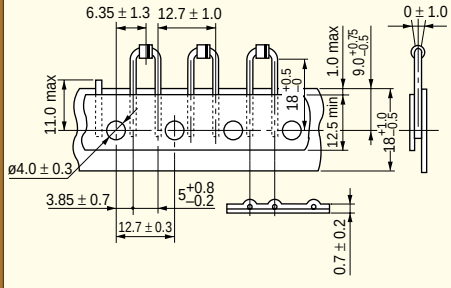
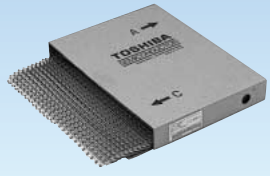


6. Tape Packing Specifications

Unit: mm

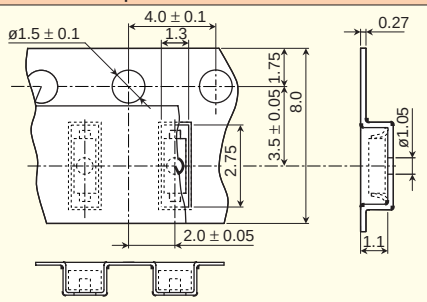
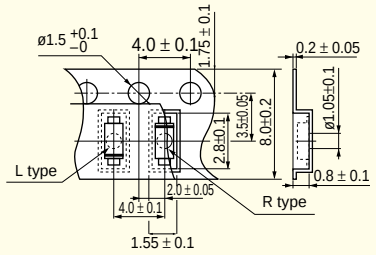
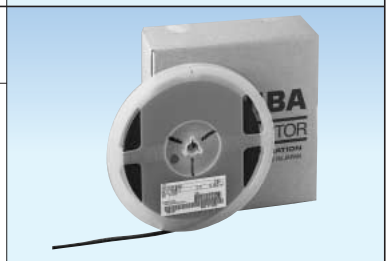
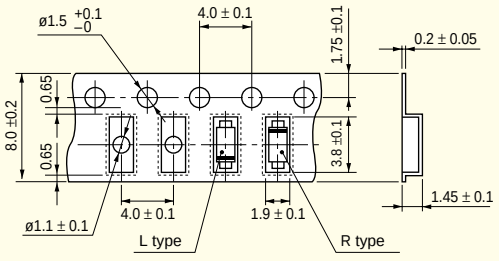
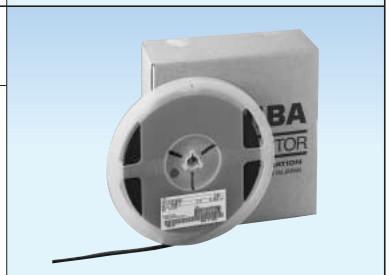
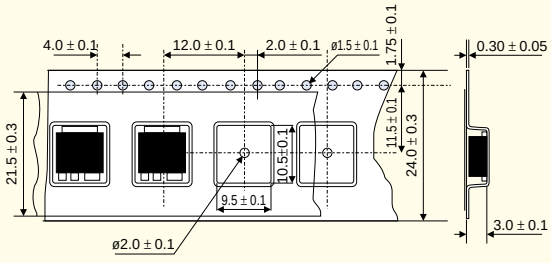
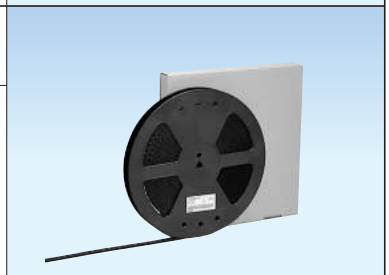
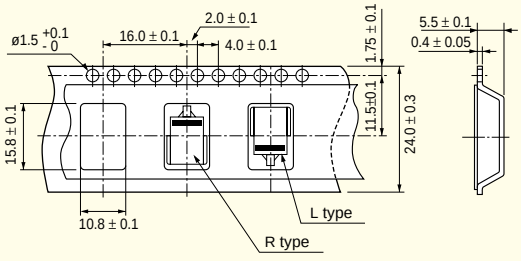
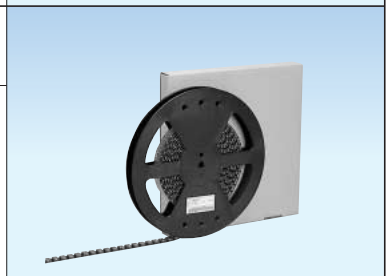
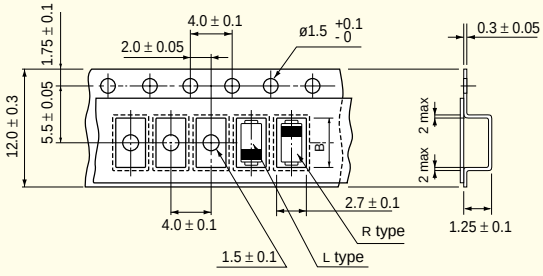
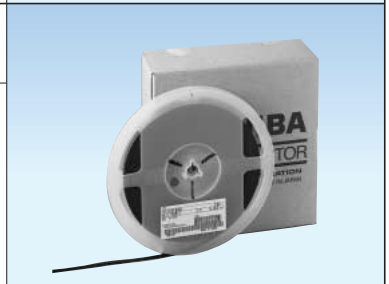
Tape Type	Tape Dimensions	Packing Quantity (pcs/box)					Packing Method
		DO-41SS	DO-41S	DO-41	DO-15	DO-15L	
TPA1		—	5000	5000	2500	—	
TPA2		—	3000	3000	1500	1000	
		3000	—	—	—	—	

Unit: mm

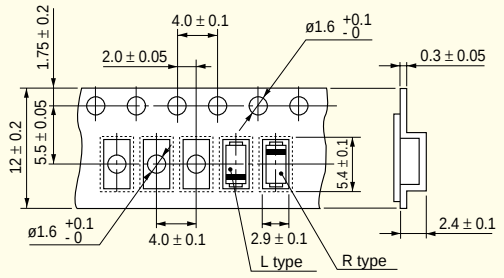
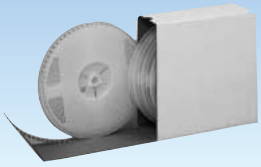
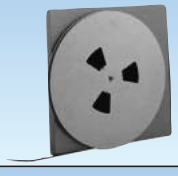
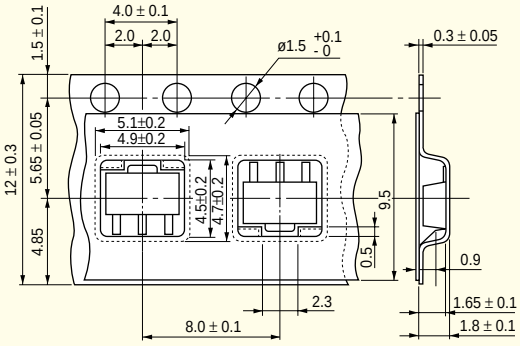
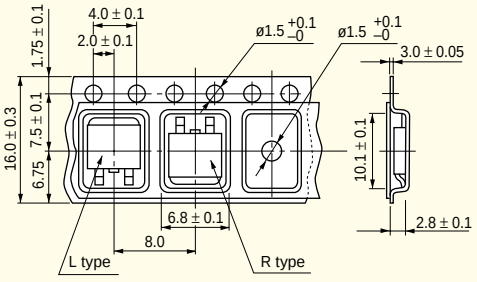
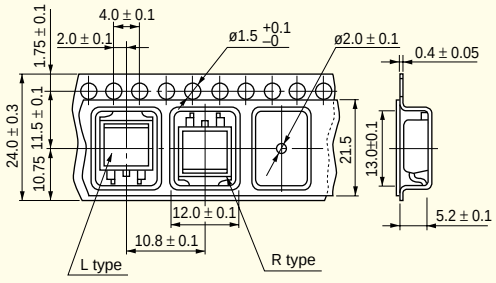
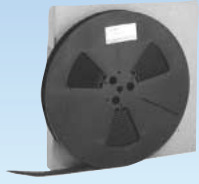
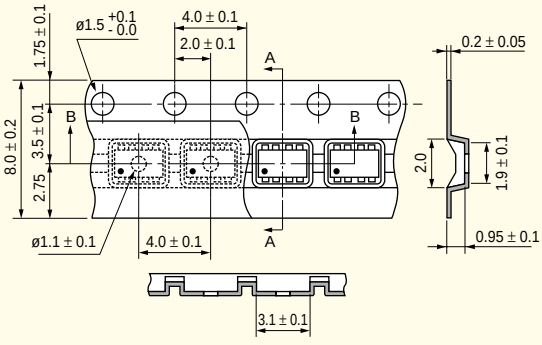
Tape Type	Tape Dimensions	Packing Quantity (pcs/box)					Packing Method
		DO-41SS	DO-41S	DO-41	DO-15	DO-15L	
TPA3		—	3000	3000	—	—	
		3000	—	—	—	—	
TPB2		—	4000	—	—	—	
TPB5		4000	—	—	—	—	

6. Tape Packing Specifications

Unit: mm

Tape Type	Tape Dimensions	Packing Quantity (pcs/box)	Packing Method
TPH3		**USC** 3000 pcs/reel (5 reel/box) (10 reel/box)	
TE85□ R or L		**US-FLAT™** 4000 pcs/reel (5 reel/box) (10 reel/box)	
TE85□ R or L		**S-FLAT™** 3000 pcs/reel (5 reel/box)	
TE24 R or L		**TFP** 1500 pcs/reel (1 reel/box)	
TE24 R or L		**MR** 750 pcs/reel (1 reel/box)	
TE12 R or L		**M-FLAT™** 3000 pcs/reel (5 reel/box) (10 reel/box)	

Unit: mm

Tape Type	Tape Dimensions	Packing Quantity (pcs/box)	Packing Method
TE12 R or L		**I-FLAT™** 2000 pcs/reel (4 reel/box)	
TE12-2□ R or L		**I-FLAT™** 7500 pcs/reel (1 reel/box)	
TE12□ R or L		**PW-MINI** 1000 pcs/reel (5 reel/box)	
TE16□ R1 or L1		**DP** R1 or L1 2000 pcs/reel	
TE24□ R or L		**TO-220SM** 1000 pcs/reel (1 reel/box)	
TE85□ R or L		**VS-8** 4000 pcs/reel (5 reel/box) (10 reel/box)	

7. Tapes Available for Different Product Series

Product Type and Part Number	Tape Type	TPA1	TPA2	TPA3	TPB2	TPB5	TE12□ R or L	TE12□-2 R or L	TE24□ R or L	TE16□ R or L	TE85 R or L	TPH3
General-Purpose Rectifiers	CRG01 Series	–	–	–	–	–	–	–	–	–	○	–
	CMC01 Series	–	–	–	–	–	○	–	–	–	–	–
	CMG02 Series	–	–	–	–	–	○	–	–	–	–	–
	S5688B Series	–	○	○	–	○	–	–	–	–	–	–
	S5566B Series	○	○	○	○	–	–	–	–	–	–	–
	1S1885 Series	○	○	–	–	–	–	–	–	–	–	–
	1S1830 Series	○	○	–	–	–	–	–	–	–	–	–
	U1BC44 Series	–	–	–	–	–	○	○	–	–	–	–
	1S1885A Series	○	○	–	–	–	–	–	–	–	–	–
	1R5BZ41 Series	○	○	–	–	–	–	–	–	–	–	–
Fast Recovery Diodes	TFR4N Series	–	○	○	–	○	–	–	–	–	–	–
	TFR3N Series	○	○	○	○	–	–	–	–	–	–	–
	TVR5B Series	–	○	○	–	○	–	–	–	–	–	–
	S5295B Series	○	○	–	–	–	–	–	–	–	–	–
	TVR1B Series	○	○	–	–	–	–	–	–	–	–	–
	TFR2N Series	○	○	–	–	–	–	–	–	–	–	–
	TFR1N Series	○	○	–	–	–	–	–	–	–	–	–
	TVR2B Series	○	○	–	–	–	–	–	–	–	–	–
	U05GH44 Series	–	–	–	–	–	○	○	–	–	–	–
	1NH42 Series	–	○	○	–	○	–	–	–	–	–	–
	1NH41 Series	○	○	○	○	–	–	–	–	–	–	–
	1S1834 Series	○	○	–	–	–	–	–	–	–	–	–
	TVR4J Series	○	○	–	–	–	–	–	–	–	–	–
Very-Fast Recovery Diodes	05NU42/1GU42 Series	–	○	○	○	–	–	–	–	–	–	–
	05NU41/1JU41 Series	○	○	○	○	–	–	–	–	–	–	–
	0R8GU41 Series	○	○	–	–	–	–	–	–	–	–	–
	1NU41 Series	○	○	–	–	–	–	–	–	–	–	–
	1R5GU41 Series	○	○	–	–	–	–	–	–	–	–	–
	U05NU44/U1GU44 Series	–	–	–	–	–	○	○	–	–	–	–
High-Efficiency Diodes	CRH01 Series	–	–	–	–	–	–	–	–	–	○	–
	CMH01 Series	–	–	–	–	–	○	–	–	–	–	–
	U1DL49 Series	–	–	–	–	–	○	–	–	–	–	–
	1DL42A Series	–	○	○	–	○	–	–	–	–	–	–
	1DL41A Series	○	○	○	○	–	–	–	–	–	–	–
	1R5DL41A Series	○	○	–	–	–	–	–	–	–	–	–
	U5DL2C48A Series	–	–	–	–	–	–	–	○	–	–	–
	U10DL2C48A Series	–	–	–	–	–	–	–	○	–	–	–
	U20DL2C48A Series	–	–	–	–	–	–	–	○	–	–	–
	U20DL2C53A Series	–	–	–	–	–	–	–	○	–	–	–
Schottky Barrier Diodes	CUS01 Series	–	–	–	–	–	–	–	–	–	○	–
	CRS01 Series	–	–	–	–	–	–	–	–	–	○	–
	CMS01 Series	–	–	–	–	–	○	–	–	–	–	–
	TPCF8E02 Series	–	–	–	–	–	–	–	–	–	○	–
	U1GWJ44 Series	–	–	–	–	–	○	○	–	–	–	–
	U1GWJ49 Series	–	–	–	–	–	○	–	–	–	–	–
	1GWJ43 Series	–	○	○	–	○	–	–	–	–	–	–
	1GWJ42 Series	○	○	○	○	–	–	–	–	–	–	–
	2GWJ42 Series	○	○	–	–	–	–	–	–	–	–	–
	U5FWK2C42 Series	–	–	–	–	–	–	–	–	○	–	–
	U5GWJ2C48 Series	–	–	–	–	–	–	–	○	–	–	–
	U10GWJ2C48 Series	–	–	–	–	–	–	–	○	–	–	–
	U30GWJ2C48 Series	–	–	–	–	–	–	–	○	–	–	–
	U30FWJ2C53M Series	–	–	–	–	–	–	–	○	–	–	–
Power Zener Diodes	1Z6.2 Series	○	○	–	–	–	–	–	–	–	–	–
	1ZB6.8 Series	–	○	○	–	○	–	–	–	–	–	–
	U1ZB12 Series	–	–	–	–	–	○	○	–	–	–	–
	2Z12 Series	○	○	–	–	–	–	–	–	–	–	–
	U02Z300N Series	–	–	–	–	–	–	–	–	–	–	○
	CRY62/CRZ10 Series	–	–	–	–	–	–	–	–	–	○	–
	CMZM16 Series	–	–	–	–	–	○	–	–	–	–	–
	CMZ12 Series	–	–	–	–	–	○	–	–	–	–	–
	U5ZA27 Series	–	–	–	–	–	–	–	○	–	–	–

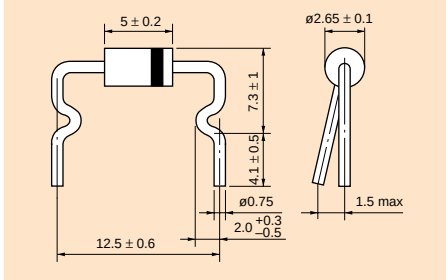
8. Lead Formed Products

The following lead formed products have different specifications.
Please contact the nearest Toshiba sales office for these products.

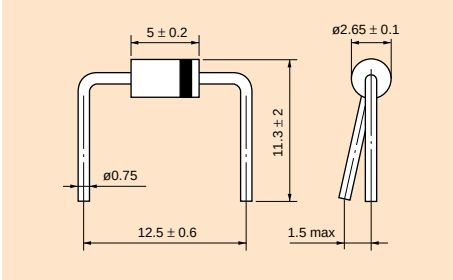
■ DO-41

Unit: mm

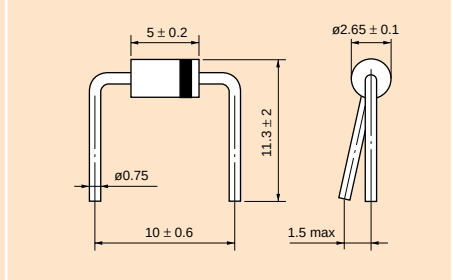
LC6



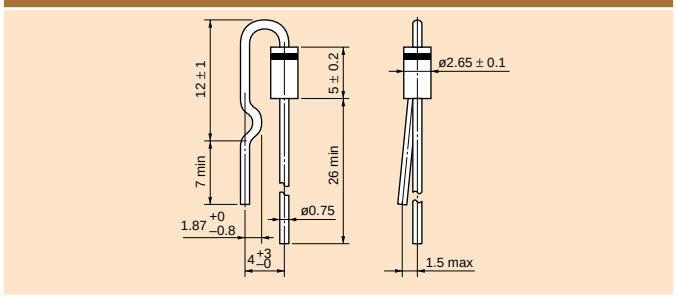
LC7



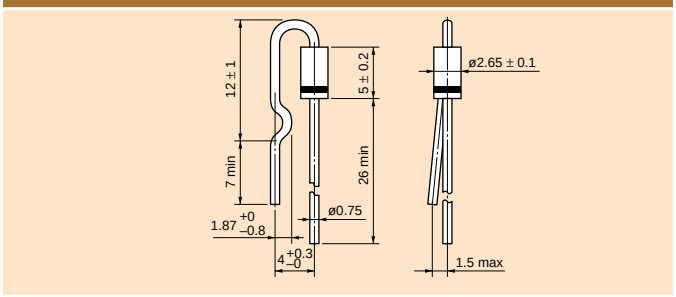
LC7-10



LC5



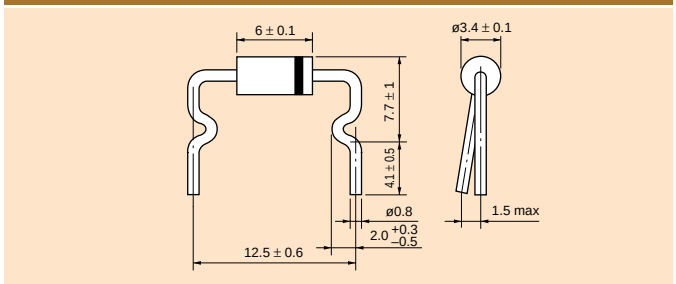
LC8



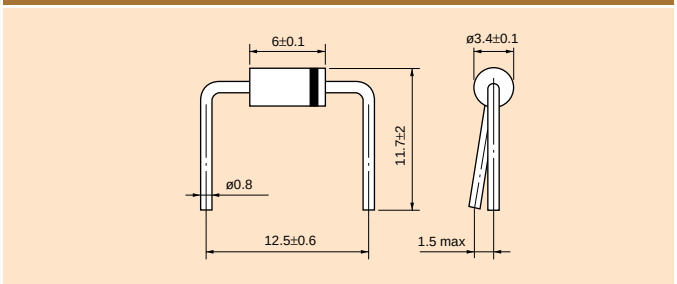
■ DO-15

Unit: mm

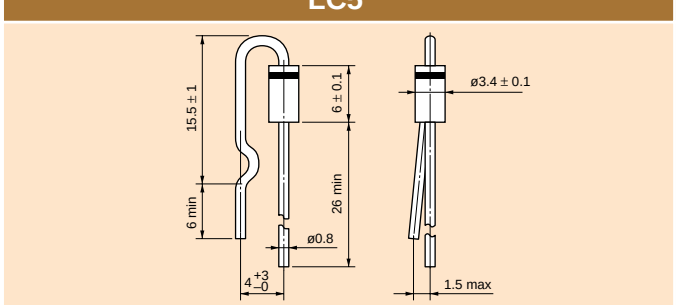
LC6



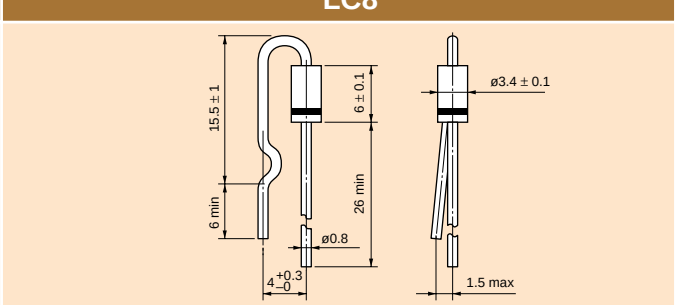
LC7



LC5



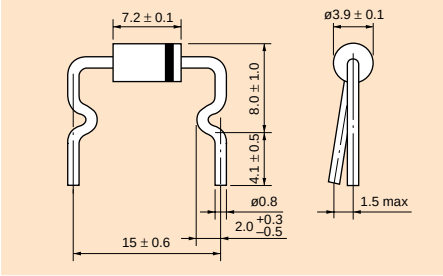
LC8



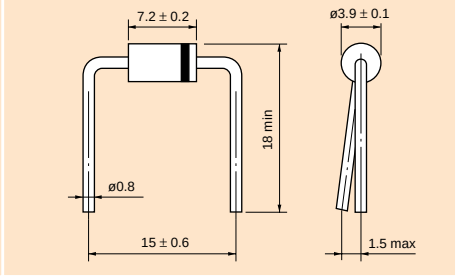
■ DO-15L

Unit: mm

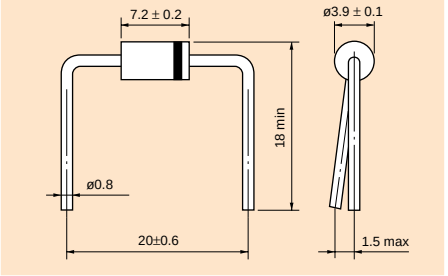
LC6-15



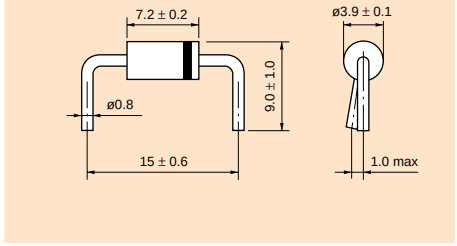
LC7-15



LC7-20



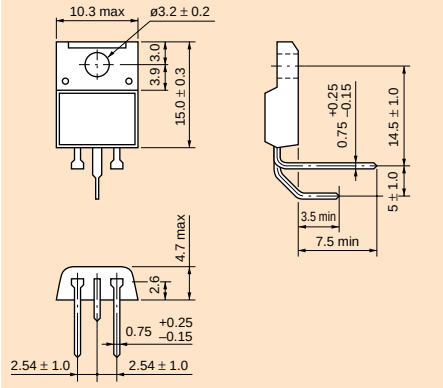
LC7-15A



■ TO-220NIS

Unit: mm

LB180



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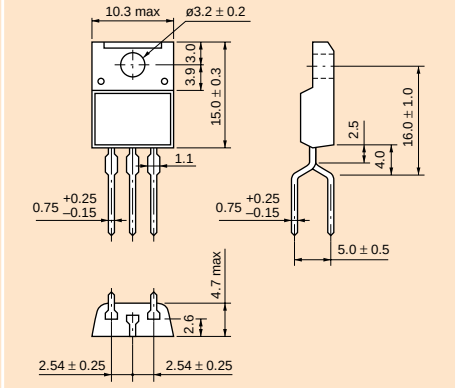

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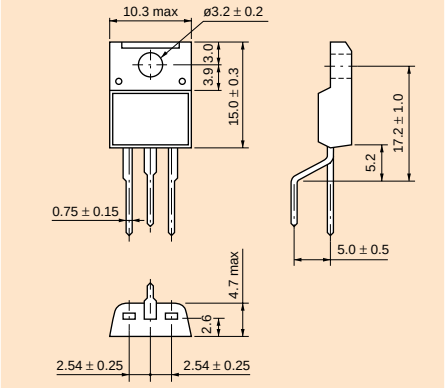

9. Package Dimensions

Unit: mm

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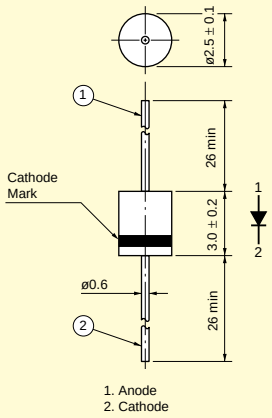

DO-41SS

3-3F2A

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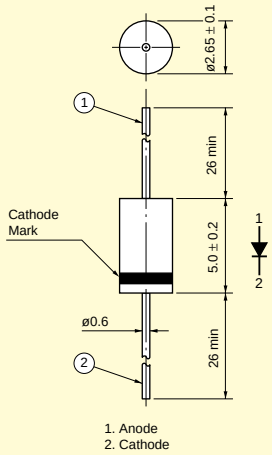

DO-41S

3-3E1A

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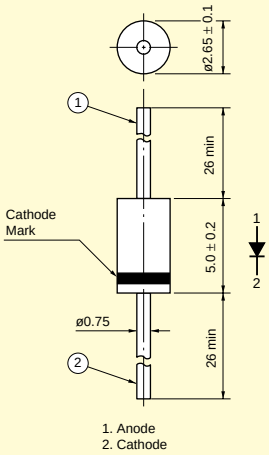

DO-41

3-3C1A

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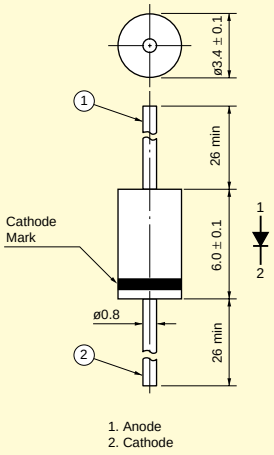
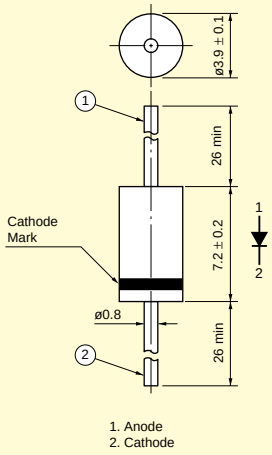


DO-15

3-3B1A

5



DO-15L

3-4B1A

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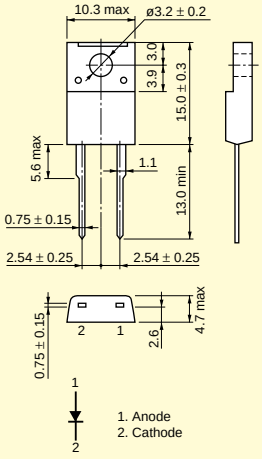
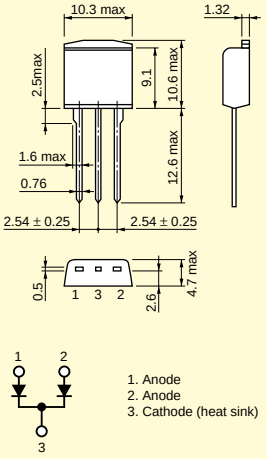


TO-220NIS

3-10C3A

7



TO-220FL

12-10D1A

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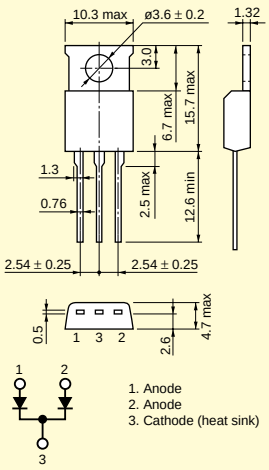

TO-220AB

12-10E1A

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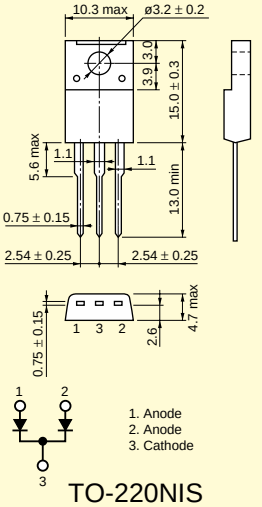


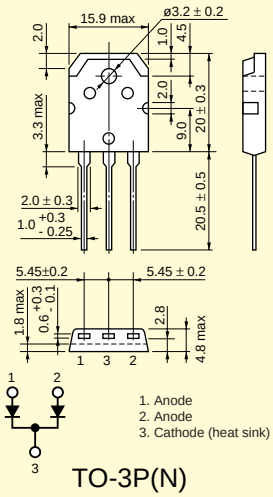
TO-220NIS

12-10C1A

9. Package Dimensions

Unit: mm

10



TO-3P(N)

12-16D1A

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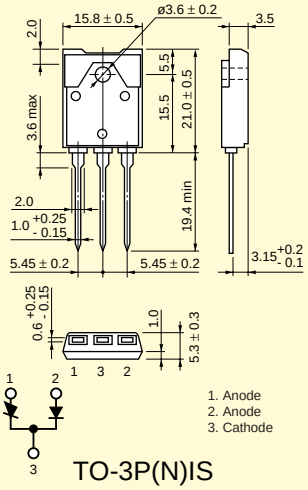

TO-3P(N)IS

12-16E1A

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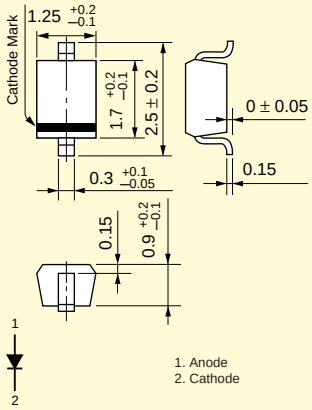

USC

I-1E1A

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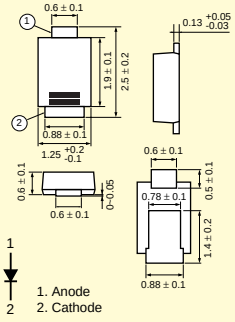
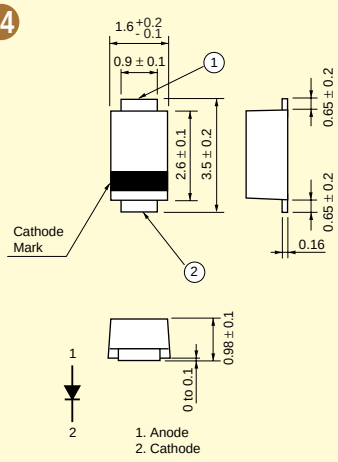


US-FLAT

3-2B1A

14



S-FLAT

3-2A1A

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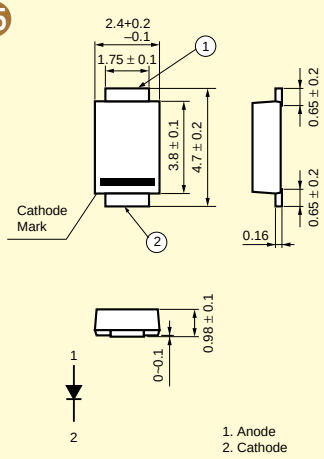

M-FLAT

3-4E1A

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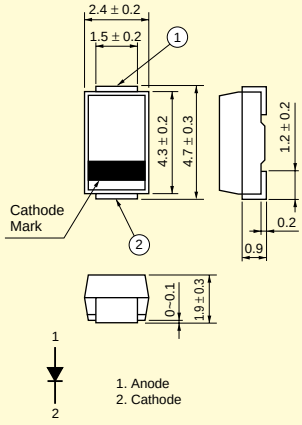
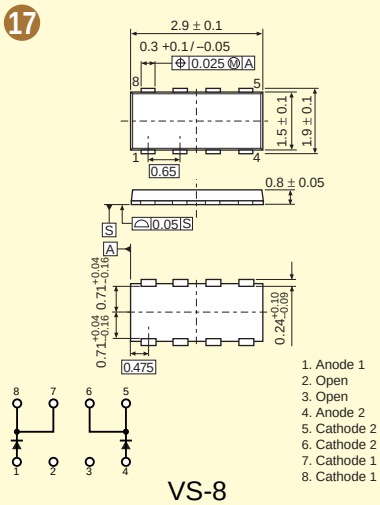


I-FLAT

3-4D1A

17



VS-8

3-3U1A

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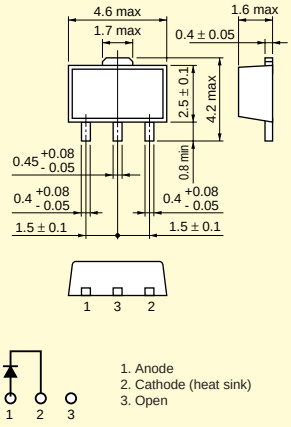
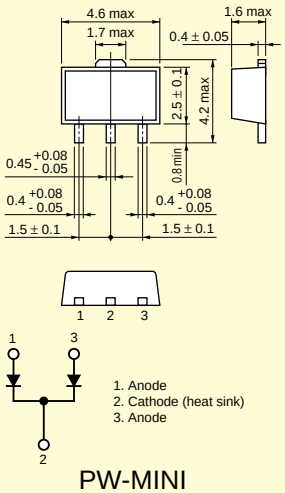


PW-MINI

3-5E1A

Unit: mm

19



PW-MINI

12-5B1A

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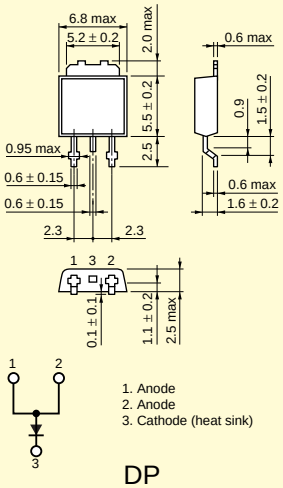

DP

12-7B2A

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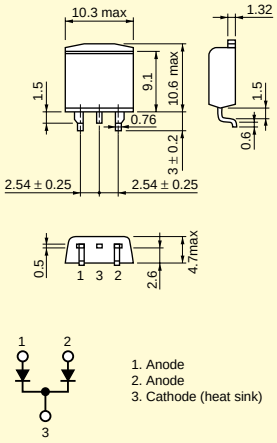

TO-220SM

12-10D2A

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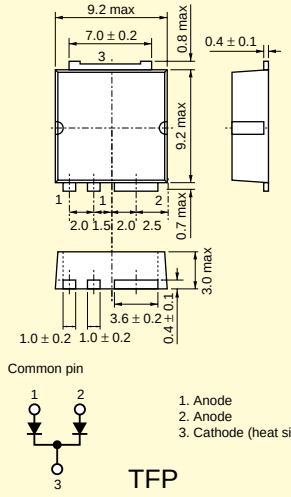

TFP

12-9B1A

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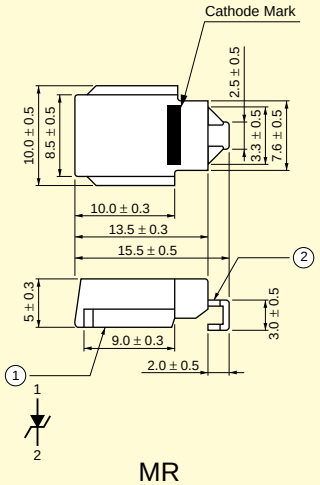

MR

3-11J2A

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