

TOSHIBA Field Effect Transistor Silicon P-Channel MOS Type (U-MOSVI)

## TPCC8105

Lithium Ion Battery Applications

Power Management Switch Applications

Unit: mm

- Small footprint due to a small and thin package
- Low drain-source ON-resistance:  
 $R_{DS(ON)} = 6.0 \text{ m}\Omega$  (typ.) ( $V_{GS} = -10 \text{ V}$ )
- Low leakage current:  $I_{DSS} = -10 \text{ }\mu\text{A}$  (max) ( $V_{DS} = -30 \text{ V}$ )
- Enhancement mode:  $V_{th} = -0.8$  to  $-2.0 \text{ V}$  ( $V_{DS} = -10 \text{ V}$ ,  $I_D = -0.5 \text{ mA}$ )

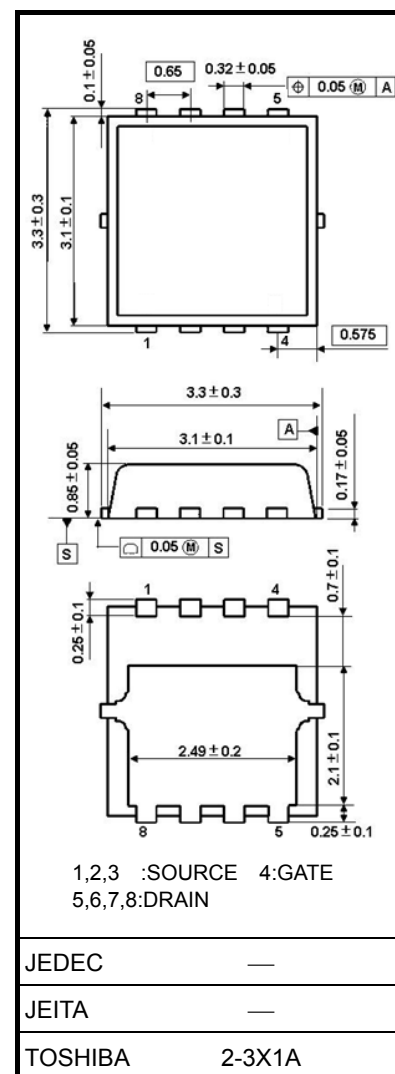
### Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

Characteristic	Symbol	Rating	Unit
Drain-source voltage	$V_{DSS}$	-30	V
Drain-gate voltage ( $R_{GS} = 20 \text{ k}\Omega$ )	$V_{DGR}$	-30	V
Gate-source voltage	$V_{GSS}$	-25/+20	V
Drain current	DC (Note 1)	$I_D$	A
	Pulsed (Note 1)	$I_{DP}$	
Drain power dissipation ( $T_c = 25^\circ\text{C}$ )	$P_D$	30	W
Drain power dissipation ( $t = 10 \text{ s}$ ) (Note 2a)	$P_D$	1.9	W
Drain power dissipation ( $t = 10 \text{ s}$ ) (Note 2b)	$P_D$	0.7	W
Single-pulse avalanche energy (Note 3)	$E_{AS}$	138	mJ
Avalanche current	$I_{AR}$	-23	A
Channel temperature	$T_{ch}$	150	$^\circ\text{C}$
Storage temperature range	$T_{stg}$	-55 to 150	$^\circ\text{C}$

Note: For Notes 1 to 4, refer to the next page.

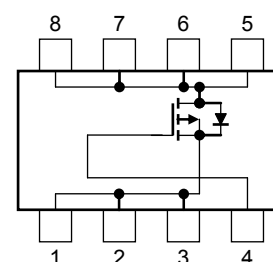
Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings. Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

This transistor is an electrostatic-sensitive device. Handle with care.



Weight: 0.02 g (typ.)

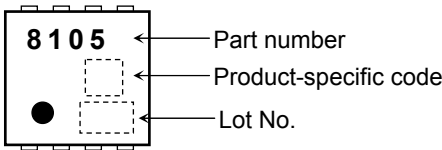
### Circuit Configuration



Thermal Characteristics

Characteristic	Symbol	Max	Unit
Thermal resistance, channel to case ( $T_c = 25^{\circ}\text{C}$ )	$R_{th(ch-c)}$	4.16	$^{\circ}\text{C/W}$
Thermal resistance, channel to ambient ( $t = 10\text{ s}$ ) (Note 2a)	$R_{th(ch-a)}$	65.7	$^{\circ}\text{C/W}$
Thermal resistance, channel to ambient ( $t = 10\text{ s}$ ) (Note 2b)	$R_{th(ch-a)}$	178	$^{\circ}\text{C/W}$

Marking

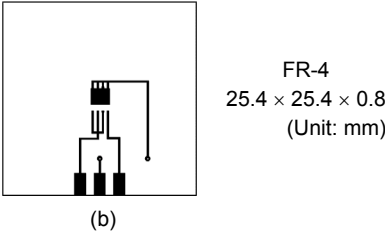
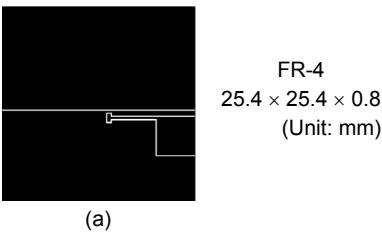


Note 1: Ensure that the channel temperature does not exceed  $150^{\circ}\text{C}$ .

Note 2

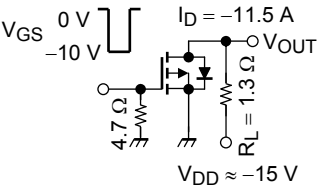
a: Device mounted on a glass-epoxy board (a)

Note 2b: Device mounted on a glass-epoxy board (b)



Note 3:  $V_{DD} = -24\text{ V}$ ,  $T_{ch} = 25^{\circ}\text{C}$  (initial),  $L = 200\text{ }\mu\text{H}$ ,  $R_G = 1\text{ }\Omega$ ,  $I_{AR} = -23\text{ A}$

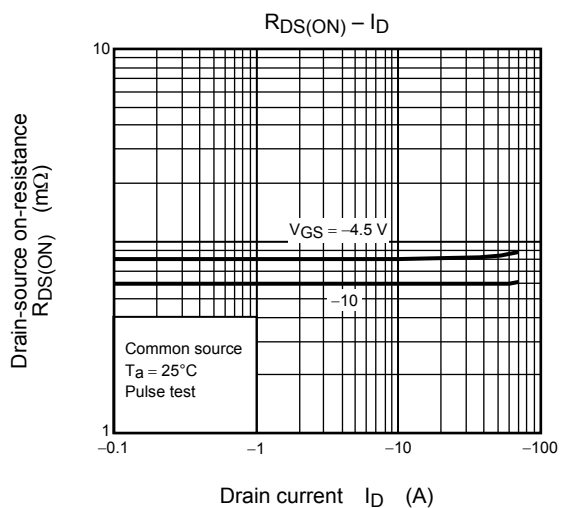
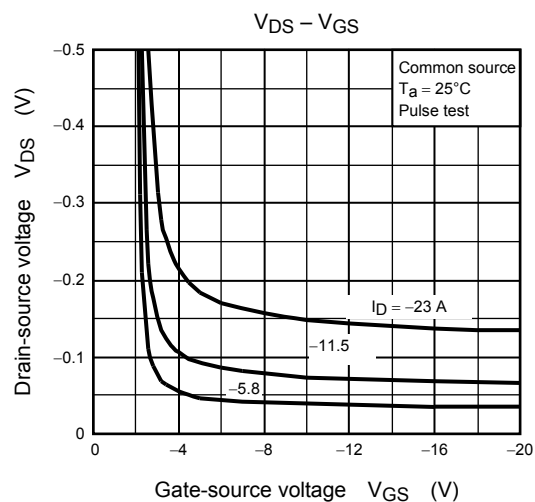
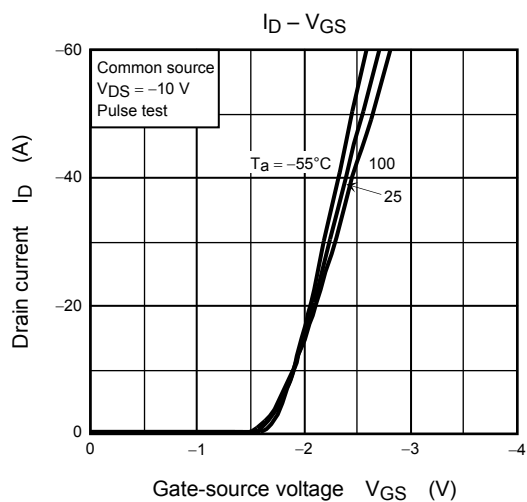
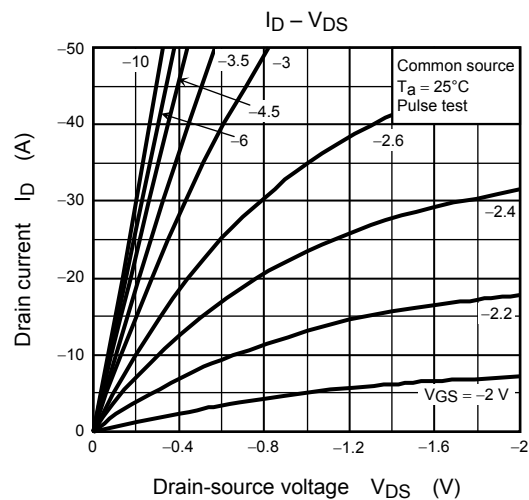
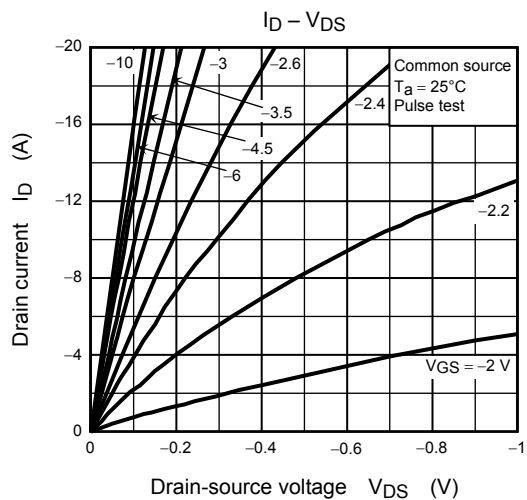
## Electrical Characteristics (T<sub>a</sub> = 25°C)

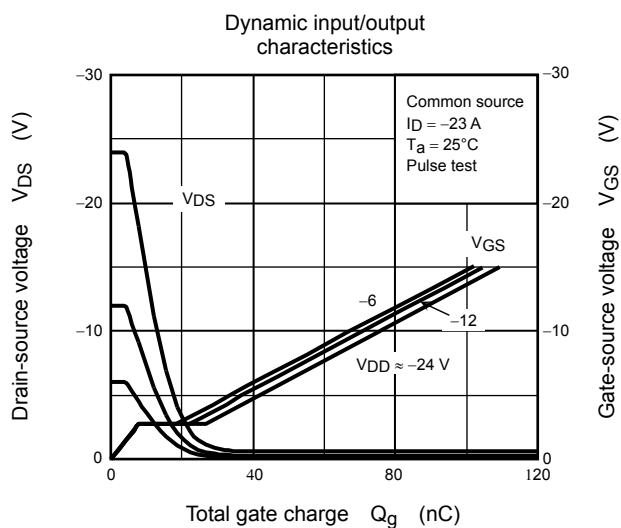
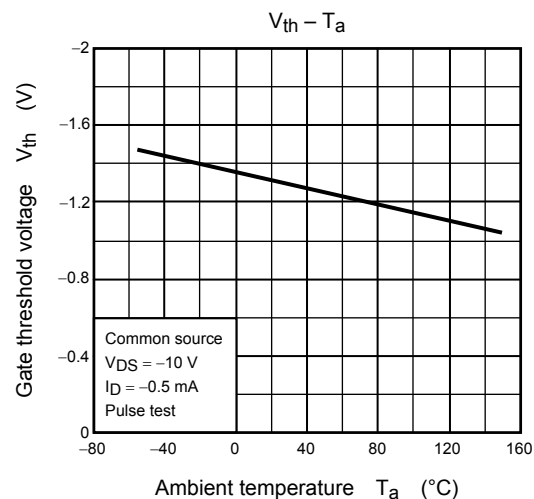
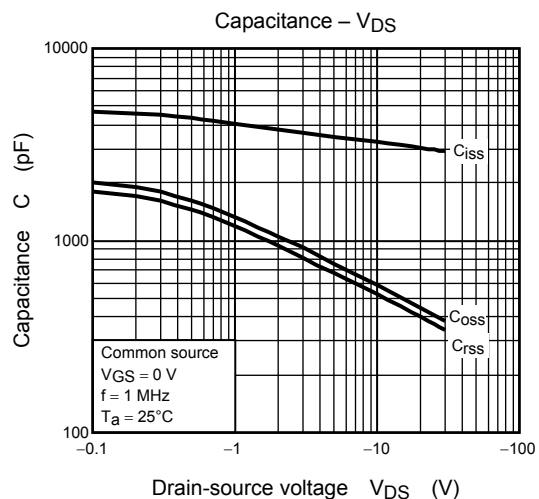
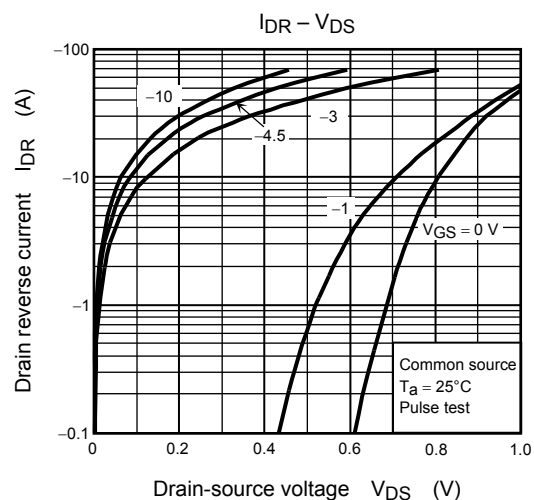
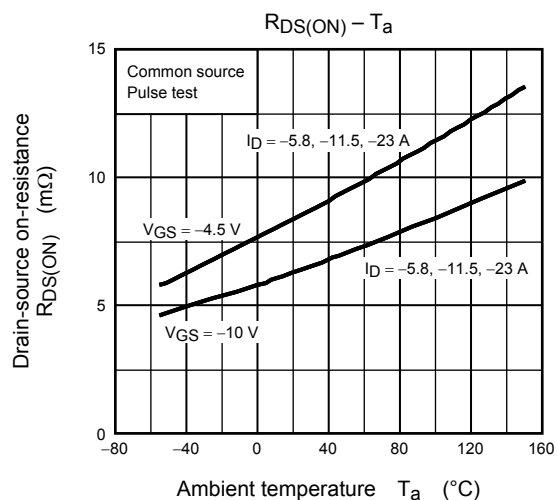
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I <sub>GSS</sub>	V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0 V	—	—	±100	nA
Drain cutoff current		I <sub>DSS</sub>	V <sub>DS</sub> = -30 V, V <sub>GS</sub> = 0 V	—	—	-10	μA
Drain-source breakdown voltage		V <sub>(BR)DSS</sub>	I <sub>D</sub> = -10 mA, V <sub>GS</sub> = 0 V	-30	—	—	V
		V <sub>(BR)DSX</sub>	I <sub>D</sub> = -10 mA, V <sub>GS</sub> = 10 V (Note 4)	-21	—	—	
Gate threshold voltage		V <sub>th</sub>	V <sub>DS</sub> = -10 V, I <sub>D</sub> = -0.5 mA	-0.8	—	-2.0	V
Drain-source on-resistance		R <sub>DS(ON)</sub>	V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -11.5 A	—	8	10.4	mΩ
			V <sub>GS</sub> = -10 V, I <sub>D</sub> = -11.5 A	—	6	7.8	
Input capacitance		C <sub>iss</sub>	V <sub>DS</sub> = -10 V, V <sub>GS</sub> = 0 V, f = 1 MHz	—	3240	—	pF
Reverse transfer capacitance		C <sub>rss</sub>		—	520	—	
Output capacitance		C <sub>oss</sub>		—	580	—	
Switching time	Rise time	t <sub>r</sub>		—	8	—	ns
	Turn-on time	t <sub>on</sub>		—	14	—	
	Fall time	t <sub>f</sub>		—	110	—	
	Turn-off time	t <sub>off</sub>		—	330	—	
Total gate charge (gate-source plus gate-drain)		Q <sub>g</sub>	V <sub>DD</sub> ≈ -24 V, V <sub>GS</sub> = -10 V, I <sub>D</sub> = -23 A	—	76	—	nC
Gate-source charge 1		Q <sub>gs1</sub>		—	7.6	—	
Gate-drain ("Miller") charge		Q <sub>gd</sub>		—	20	—	

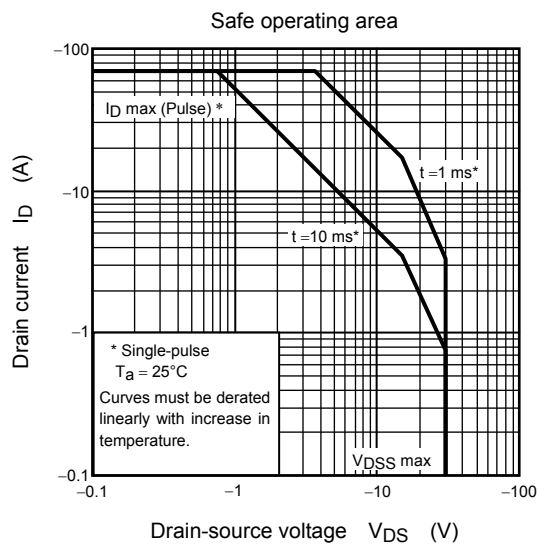
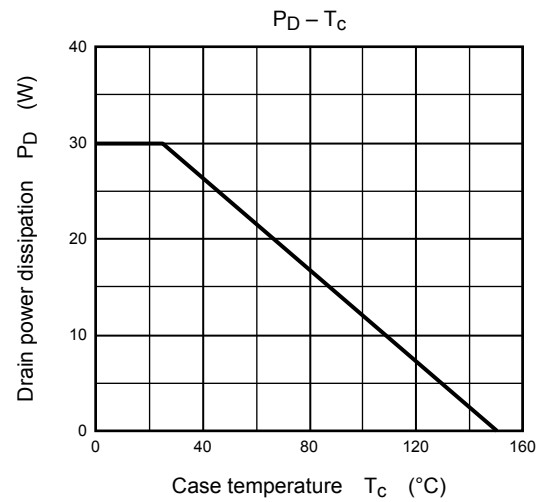
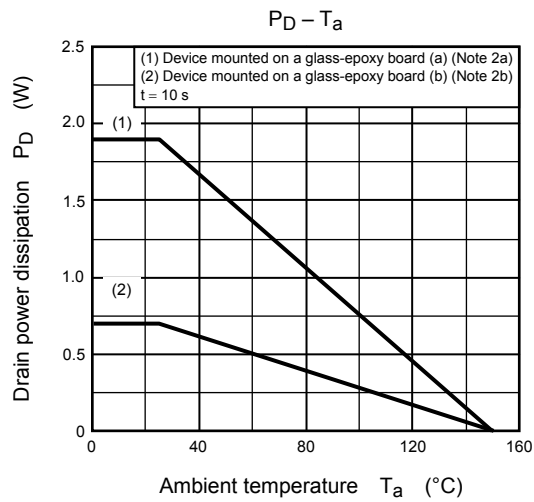
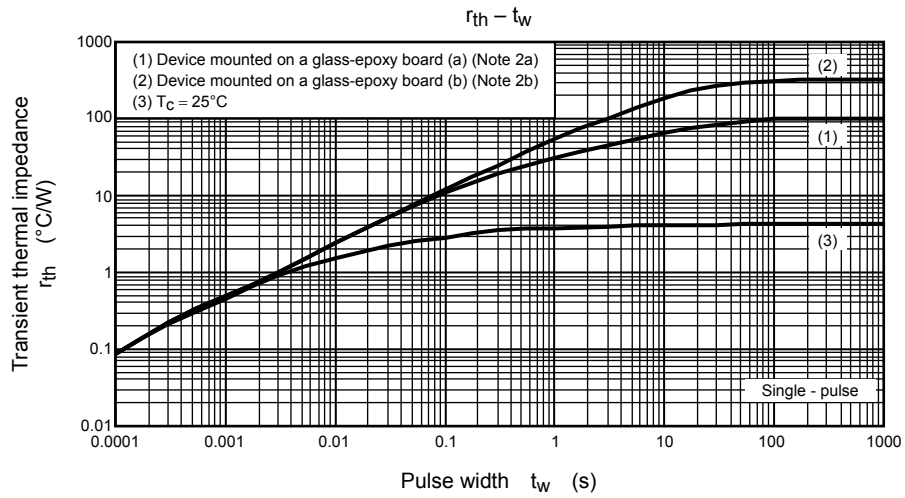
## Source-Drain Ratings and Characteristics (T<sub>a</sub> = 25°C)

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	I <sub>DRP</sub>	—	—	—	-69	A
Forward voltage (diode)		V <sub>DSF</sub>	I <sub>DR</sub> = -23 A, V <sub>GS</sub> = 0 V	—	—	1.2	V

Note 4: V<sub>DSX</sub> mode (the application of a plus voltage between gate and source) may cause decrease in maximum rating of drain-source voltage.







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