HAF2027(L), HAF2027(S)

Silicon N Channel Power MOS FET
Power Switching

REJ03G1674-0100
Rev.1.00
May 19, 2008

Description

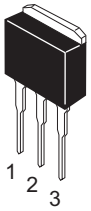
This FET has the over temperature shut-down capability sensing to the junction temperature. This FET has the built-in over temperature shut-down circuit in the gate area. And this circuit operation to shut-down the gate voltage in case of high junction temperature like applying over power consumption, over current etc..

Features

- Logic level operation (4 V Gate drive)
- Built-in the over temperature shut-down circuit
- High endurance capability against to the shut-down circuit
- Latch type shut down operation (need 0 voltage recovery)

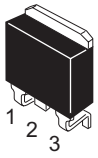
Outline

RENESAS Package code: PRSS0004AE-A
(Package name: LDPAK (L))



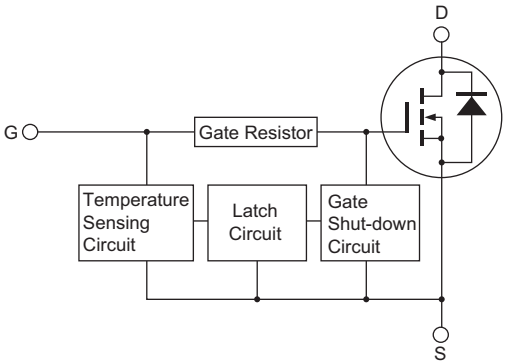
HAF2027(L)

RENESAS Package code: PRSS0004AE-B
(Package name: LDPAK (S)-(1))



HAF2027(S)

1. Gate
2. Drain
   (Flange)
3. Source



Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DSS}	60	V
Gate to source voltage	V_{GSS}	16	V
Gate to source voltage	V_{GSS}	–2.5	V
Drain current	I_D	50	A
Drain peak current	I_D (pulse) Note1	100	A
Body-drain diode reverse drain current	I_{DR}	50	A
Cannel dissipation	Pch Note2	100	W
Cannel temperature	Tch	150	°C
Storage temperature	Tstg	–55 to +150	°C

Notes: 1. PW ≤ 10ms, duty cycle ≤ 1 %
2. Value at Tc = 25°C

Typical Operation Characteristics

(Ta=25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Input voltage	V_{IH}	3.5	—	—	V	
	V_{IL}	—	—	1.2	V	
Input current (Gate non shut down)	I_{IH1}	—	—	100	µA	Vi = 6 V, V_{DS} = 0
	I_{IH2}	—	—	50	µA	Vi = 3.5 V, V_{DS} = 0
	I_{IL}	—	—	1	µA	Vi = 1.2 V, V_{DS} = 0
Input current (Gate shut down)	$I_{IH(sd)1}$	—	0.6	—	mA	Vi = 6 V, V_{DS} = 0
	$I_{IH(sd)2}$	—	0.35	—	mA	Vi = 3.5 V, V_{DS} = 0
Shut down temperature	Tsd	—	175	—	°C	Cannel temperature
Gate operation voltage	Vop	3.5	—	12	V	

Electrical Characteristics

(Ta = 25°C)

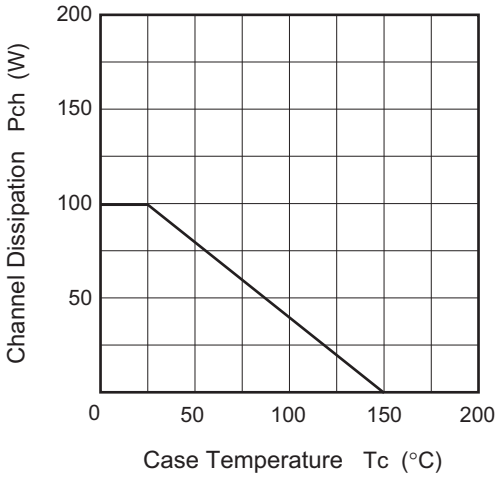
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain current	I_{D1}	80	—	—	A	V_{GS} = 6 V, V_{DS} = 10 V Note3
	I_{D2}	15	—	—	A	V_{GS} = 3.5 V, V_{DS} = 10 V Note3
	I_{D3}	—	—	10	mA	V_{GS} = 1.2 V, V_{DS} = 10 V Note3
Drain to source breakdown voltage	$V_{(BR)DSS}$	60	—	—	V	I_D = 10 mA, V_{GS} = 0
Gate to source breakdown voltage	$V_{(BR)GSS}$	16	—	—	V	I_G = 300 µA, V_{DS} = 0
	$V_{(BR)GSS}$	–2.5	—	—	V	I_G = –100 µA, V_{DS} = 0
Gate to source leak current	I_{GSS1}	—	—	100	µA	V_{GS} = 6 V, V_{DS} = 0
	I_{GSS2}	—	—	50	µA	V_{GS} = 3.5 V, V_{DS} = 0
	I_{GSS3}	—	—	1	µA	V_{GS} = 1.2 V, V_{DS} = 0
	I_{GSS4}	—	—	–100	µA	V_{GS} = –2.4 V, V_{DS} = 0
Input current (shut down)	$I_{GS(OP)1}$	—	0.6	—	mA	V_{GS} = 6 V, V_{DS} = 0
	$I_{GS(OP)2}$	—	0.35	—	mA	V_{GS} = 3.5 V, V_{DS} = 0
Zero gate voltage drain current	I_{DSS}	—	—	10	µA	V_{DS} = 60 V, V_{GS} = 0
Gate to source cut off voltage	$V_{GS(off)}$	1.0	—	2.25	V	V_{DS} = 10 V, I_D = 1 mA
Forward transfer admittance	$\|y_{fs}\|$	15	65	—	S	I_D = 25 A, V_{DS} = 10 V Note3
Static drain to source on state resistance	$R_{DS(on)}$	—	7.7	10	mΩ	I_D = 25 A, V_{GS} = 10 V Note3
	$R_{DS(on)}$	—	10.3	15	mΩ	I_D = 25 A, V_{GS} = 4 V Note3
Output capacitance	Coss	—	1423	—	pF	V_{DS} = 10 V, V_{GS} = 0, f = 1MHz
Turn-on delay time	$t_{d(on)}$	—	10	—	µs	V_{GS} = 10 V, I_D= 25 A, R_L = 1.2 Ω
Rise time	t_r	—	48	—	µs	
Turn off delay time	$t_{d(off)}$	—	22	—	µs	
Fall time	t_f	—	23	—	µs	
Body-drain diode forward voltage	V_{DF}	—	0.9	—	V	I_F = 50 A, V_{GS} = 0
Body-drain diode reverse recovery time	t_{rr}	—	102	—	ns	I_F = 50 A, V_{GS} = 0, di_F/dt = 100 A/µs
Over load shut down operation time Note4	t_{os1}	—	0.7	—	ms	V_{GS} = 5 V, V_{DD} = 16 V
	t_{os2}	—	0.43	—	ms	V_{GS} = 5 V, V_{DD} = 24 V

Notes: 3. Pulse test

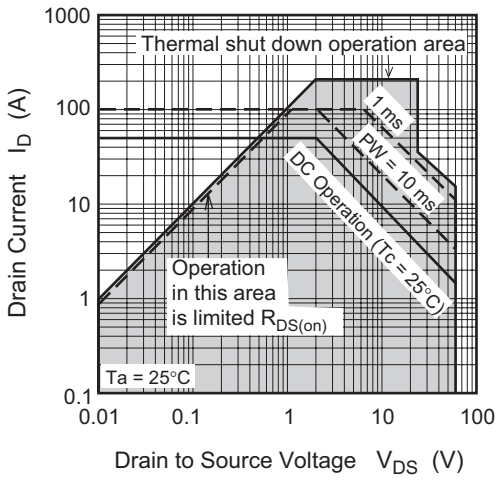
4. Including the junction temperature rise of the over lorded condition.

Main Characteristics

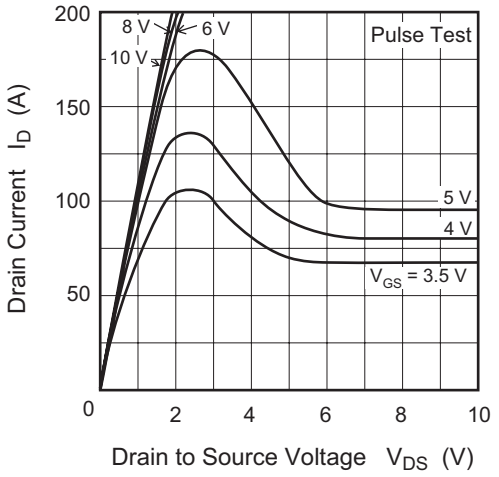
Power vs. Temperature Derating



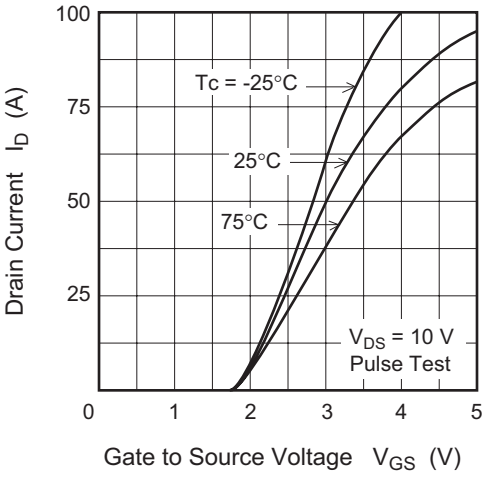
Maximum Safe Operation Area



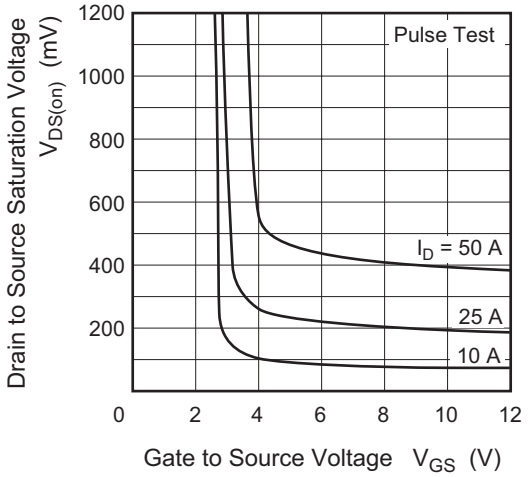
Typical Output Characteristics



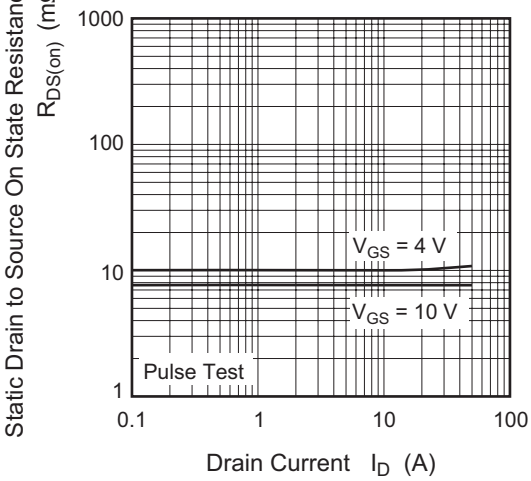
Typical Transfer Characteristics



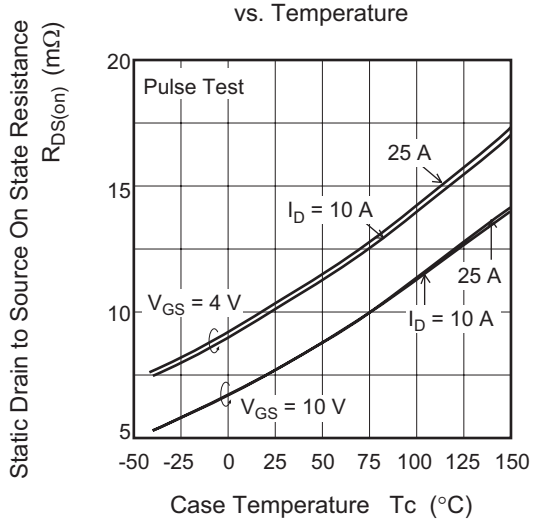
Drain Source Saturation Voltage vs. Gate to Source Voltage



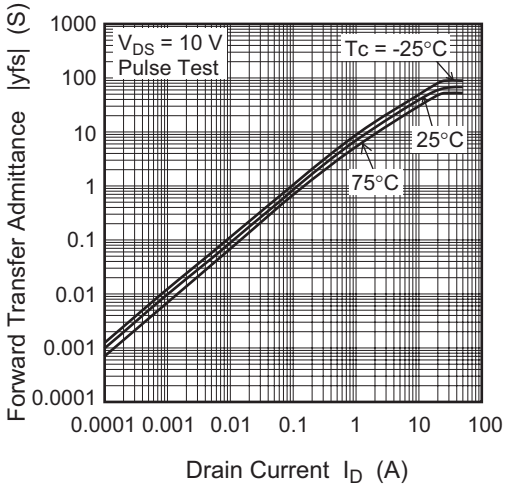
Static Drain to Source State Resistance vs. Drain Current



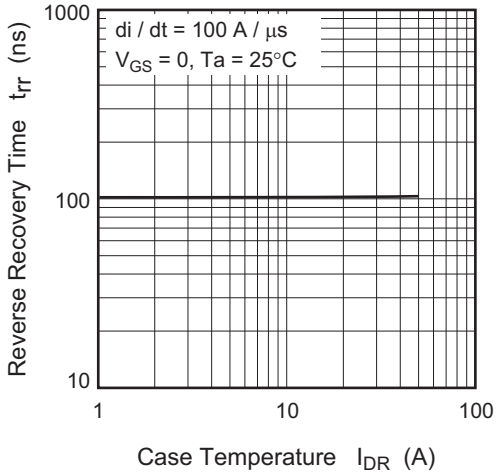
Static Drain to Source on State Resistance vs. Temperature



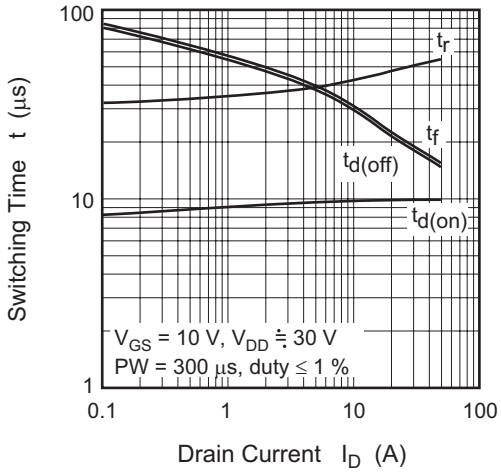
Forward Transfer Admittance vs. Drain Current



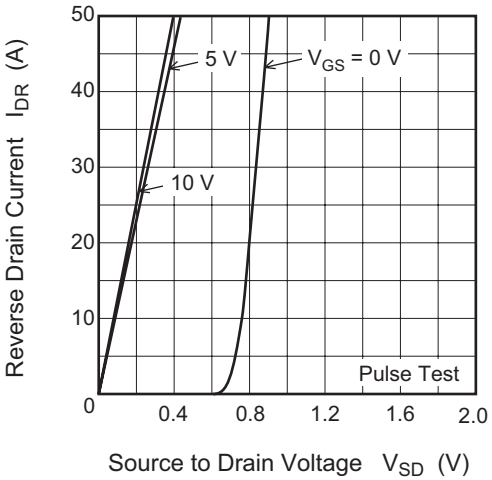
Body-Drain Diode Reverse Recovery Time



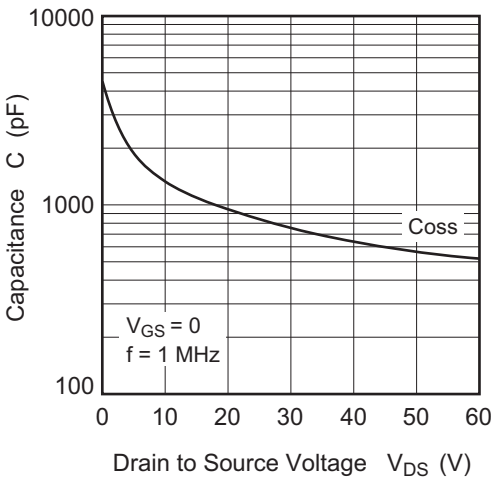
Switching Characteristics



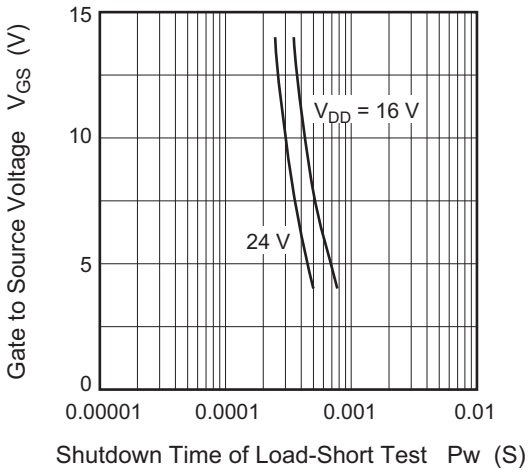
Reverse Drain Current vs. Source to Drain Voltage



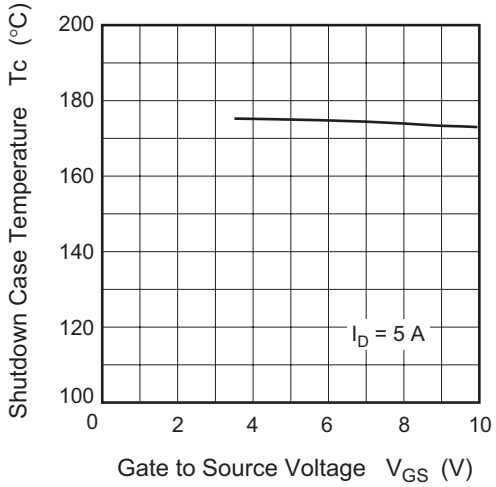
Typical Capacitance vs. Drain to Source Voltage



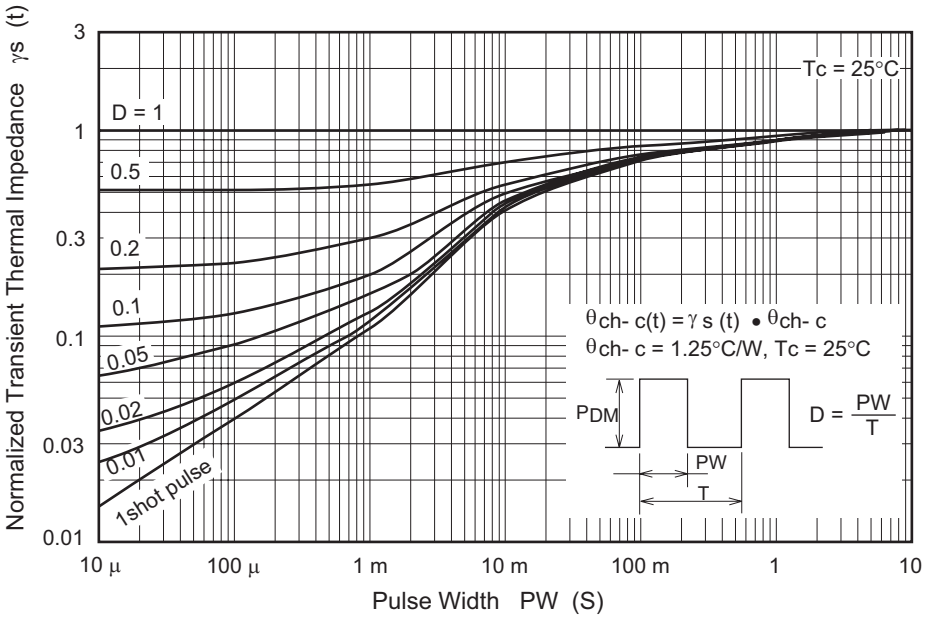
Gate to Source Voltage vs.
Shutdown Time of Load-Short Test



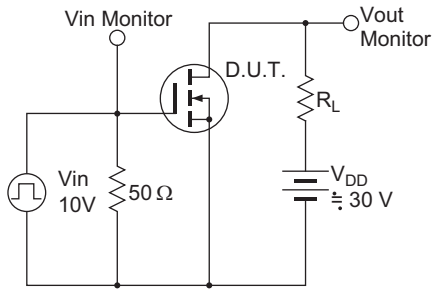
Shutdown Case Temperature vs.
Gate to Source Voltage



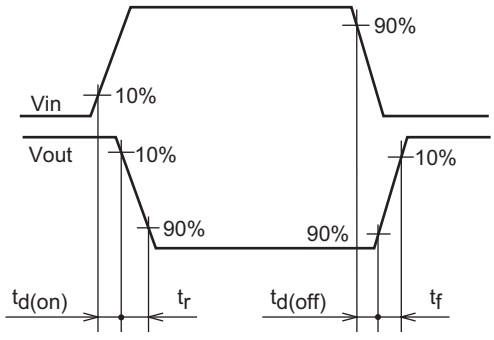
Normalized Transient Thermal Impedance vs. Pulse Width



Switching Time Test Circuit



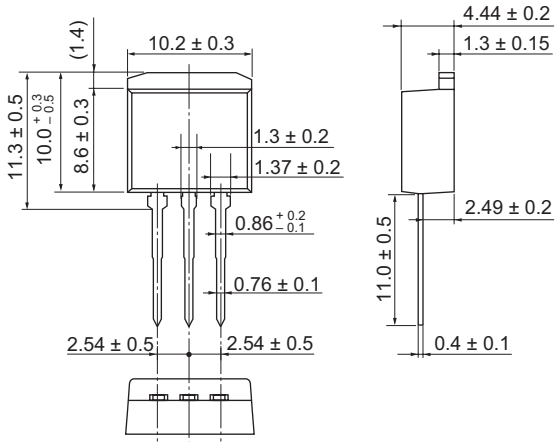
Waveform



Package Dimensions

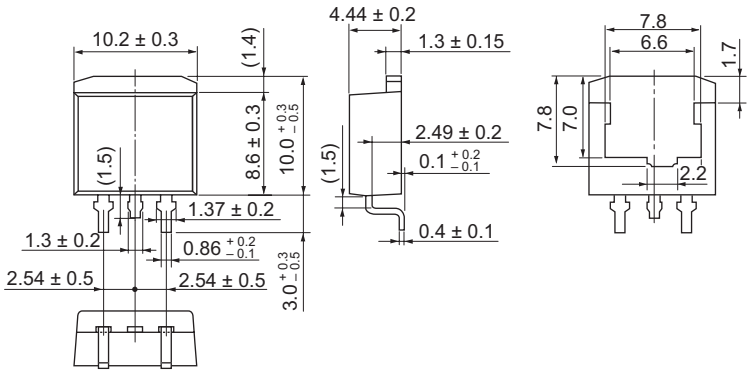
Package Name	JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
LDPAK(L)	—	PRSS0004AE-A	LDPAK(L) / LDPAK(L)V	1.40g

Unit: mm



Package Name	JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
LDPAK(S)-(1)	SC-83	PRSS0004AE-B	LDPAK(S)-(1) / LDPAK(S)-(1)V	1.30g

Unit: mm



Ordering Information

Part No.	Quantity	Shipping Container
HAF2027-90STL-E	1000 pcs/Reel	Taping (Reel)
HAF2027-90STR-E	1000 pcs/Reel	Taping (Reel)

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http://www.renesas.com

Refer to "**http://www.renesas.com/en/network**" for the latest and detailed information.

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Colophon .7.2