

HAF2027(L), HAF2027(S)

Silicon N Channel Power MOS FET
Power Switching

REJ03G1674-0100

Rev.1.00

May 19, 2008

Description

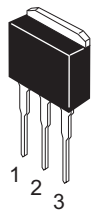
This FET has the over temperature shut-down capability sensing to the junction temperature. This FET has the built-in over temperature shut-down circuit in the gate area. And this circuit operation to shut-down the gate voltage in case of high junction temperature like applying over power consumption,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

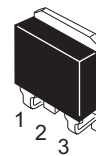
Outline

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



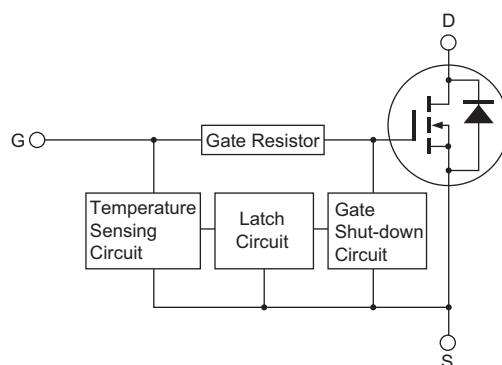
HAF2027(L)

RENESAS Package code: PRSS0004AE-B
(Package name: LDKPAK (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_{DS}	60	V
Gate to source voltage	V_{GS}	16	V
Gate to source voltage	V_{GS}	-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
Channel dissipation	P_{ch} ^{Note2}	100	W
Channel temperature	T_{ch}	150	°C
Storage temperature	T_{stg}	-55 to +150	°C

Notes: 1. $PW \leq 10ms$, duty cycle $\leq 1\%$ 2. Value at $T_c = 25^\circ C$

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	$V_i = 6V, V_{DS} = 0$
	I_{IH2}	—	—	50	μA	$V_i = 3.5V, V_{DS} = 0$
	I_{IL}	—	—	1	μA	$V_i = 1.2V, V_{DS} = 0$
Input current (Gate shut down)	$I_{IH(sd)1}$	—	0.6	—	mA	$V_i = 6V, V_{DS} = 0$
	$I_{IH(sd)2}$	—	0.35	—	mA	$V_i = 3.5V, V_{DS} = 0$
Shut down temperature	T_{sd}	—	175	—	°C	Channel temperature
Gate operation voltage	V_{op}	3.5	—	12	V	

Electrical Characteristics

(Ta = 25°C)

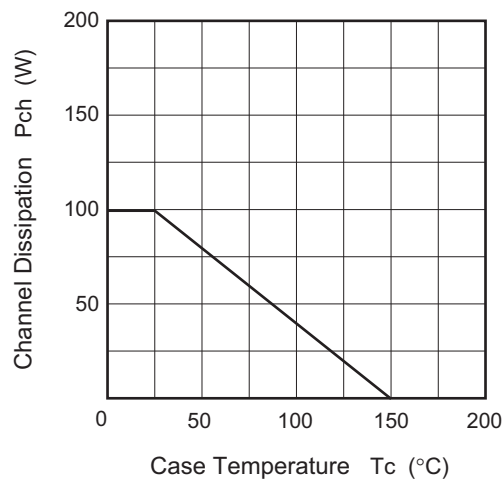
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain current	I_{D1}	80	—	—	A	$V_{GS} = 6\text{ V}$, $V_{DS} = 10\text{ V}$ ^{Note3}
	I_{D2}	15	—	—	A	$V_{GS} = 3.5\text{ V}$, $V_{DS} = 10\text{ V}$ ^{Note3}
	I_{D3}	—	—	10	mA	$V_{GS} = 1.2\text{ V}$, $V_{DS} = 10\text{ V}$ ^{Note3}
Drain to source breakdown voltage	$V_{(BR)DSS}$	60	—	—	V	$I_D = 10\text{ mA}$, $V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	16	—	—	V	$I_G = 300\text{ }\mu\text{A}$, $V_{DS} = 0$
	$V_{(BR)GSS}$	-2.5	—	—	V	$I_G = -100\text{ }\mu\text{A}$, $V_{DS} = 0$
Gate to source leak current	I_{GSS1}	—	—	100	μA	$V_{GS} = 6\text{ V}$, $V_{DS} = 0$
	I_{GSS2}	—	—	50	μA	$V_{GS} = 3.5\text{ V}$, $V_{DS} = 0$
	I_{GSS3}	—	—	1	μA	$V_{GS} = 1.2\text{ V}$, $V_{DS} = 0$
	I_{GSS4}	—	—	-100	μA	$V_{GS} = -2.4\text{ V}$, $V_{DS} = 0$
Input current (shut down)	$I_{GS(OP)1}$	—	0.6	—	mA	$V_{GS} = 6\text{ V}$, $V_{DS} = 0$
	$I_{GS(OP)2}$	—	0.35	—	mA	$V_{GS} = 3.5\text{ V}$, $V_{DS} = 0$
Zero gate voltage drain current	I_{DSS}	—	—	10	μA	$V_{DS} = 60\text{ V}$, $V_{GS} = 0$
Gate to source cut off voltage	$V_{GS(off)}$	1.0	—	2.25	V	$V_{DS} = 10\text{ V}$, $I_D = 1\text{ mA}$
Forward transfer admittance	$ y_{fs} $	15	65	—	S	$I_D = 25\text{ A}$, $V_{DS} = 10\text{ V}$ ^{Note3}
Static drain to source on state resistance	$R_{DS(on)}$	—	7.7	10	$\text{m}\Omega$	$I_D = 25\text{ A}$, $V_{GS} = 10\text{ V}$ ^{Note3}
	$R_{DS(on)}$	—	10.3	15	$\text{m}\Omega$	$I_D = 25\text{ A}$, $V_{GS} = 4\text{ V}$ ^{Note3}
Output capacitance	C_{OSS}	—	1423	—	pF	$V_{DS} = 10\text{ V}$, $V_{GS} = 0$, $f = 1\text{ MHz}$
Turn-on delay time	$t_{d(on)}$	—	10	—	μs	$V_{GS} = 10\text{ V}$, $I_D = 25\text{ A}$, $R_L = 1.2\text{ }\Omega$
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	$I_F = 50\text{ A}$, $V_{GS} = 0$
Body-drain diode reverse recovery time	t_{rr}	—	102	—	ns	$I_F = 50\text{ A}$, $V_{GS} = 0$, $di_F/dt = 100\text{ A}/\mu\text{s}$
Over load shut down operation time ^{Note4}	t_{OS1}	—	0.7	—	ms	$V_{GS} = 5\text{ V}$, $V_{DD} = 16\text{ V}$
	t_{OS2}	—	0.43	—	ms	$V_{GS} = 5\text{ V}$, $V_{DD} = 24\text{ V}$

Notes: 3. Pulse test

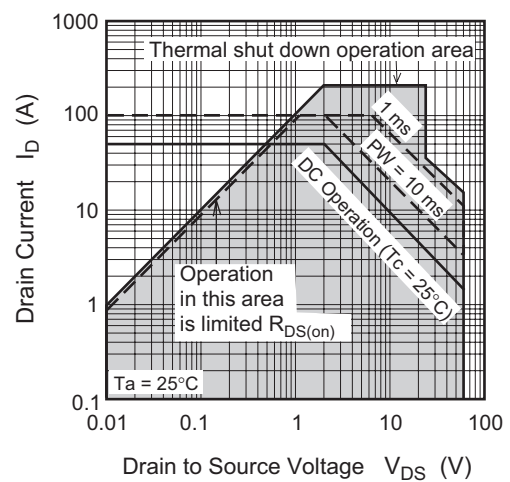
4. Including the junction temperature rise of the over loded condition.

Main Characteristics

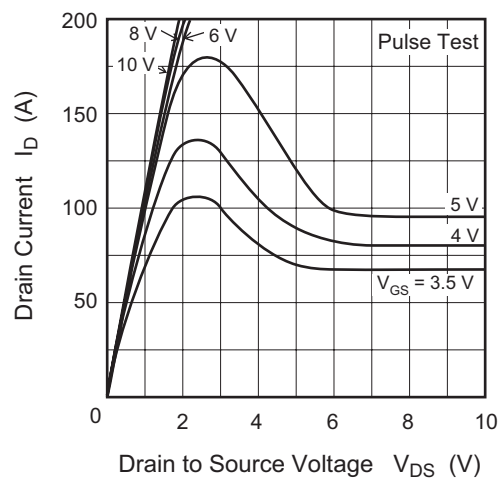
Power vs. Temperature Derating



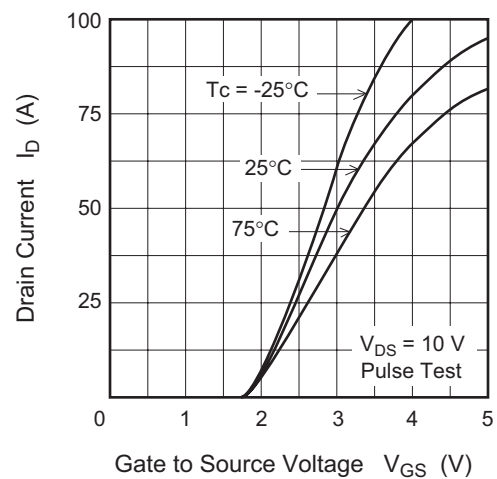
Maximum Safe Operation Area



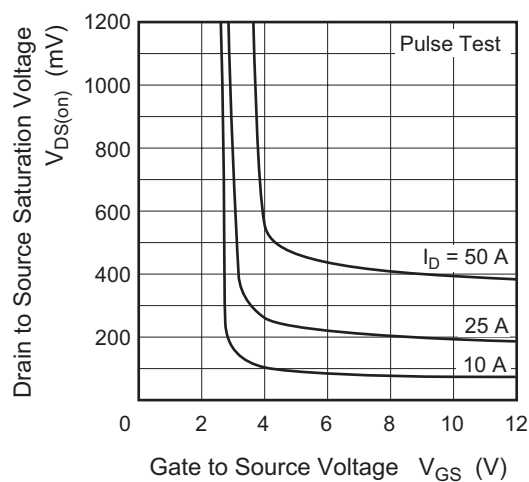
Typical Output Characteristics



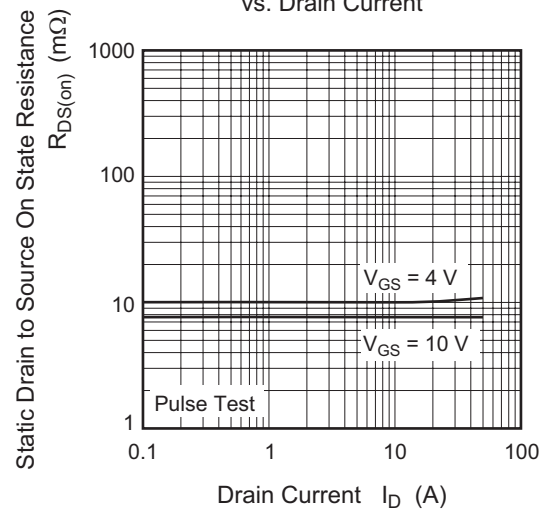
Typical Transfer Characteristics

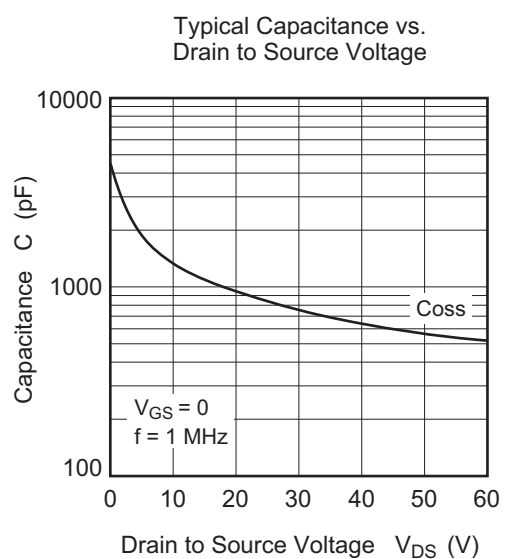
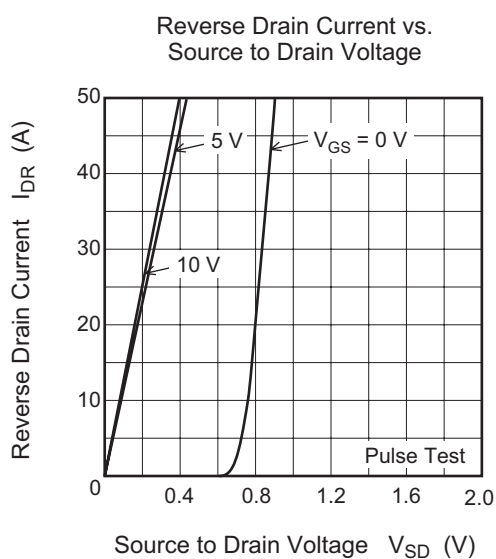
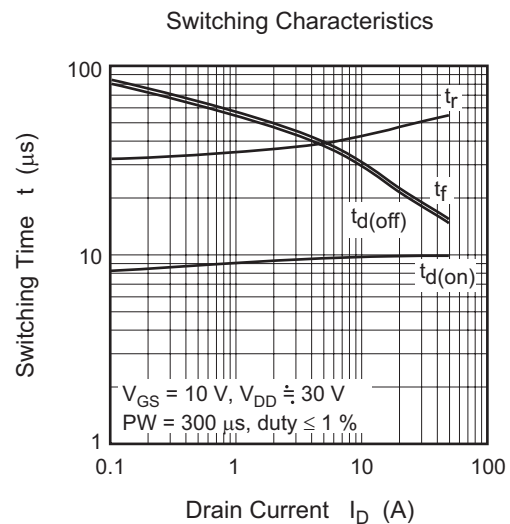
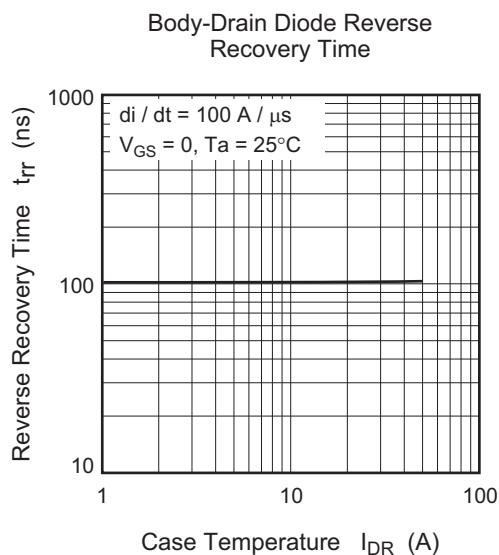
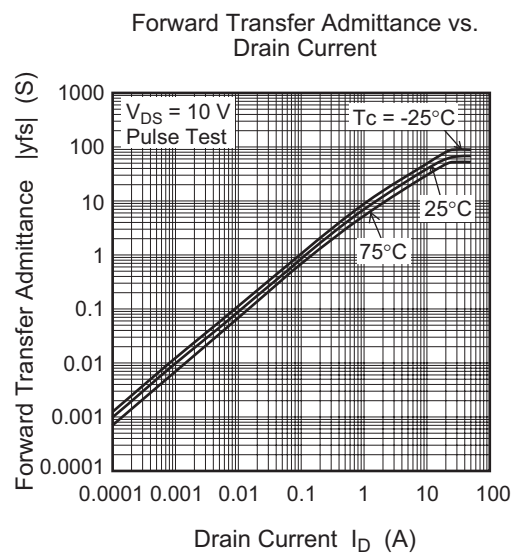
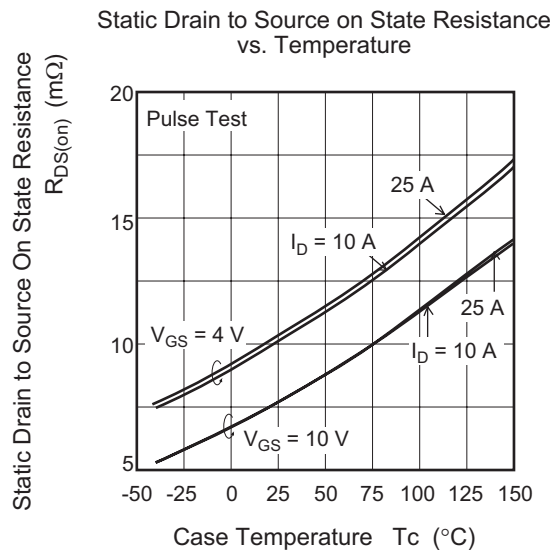


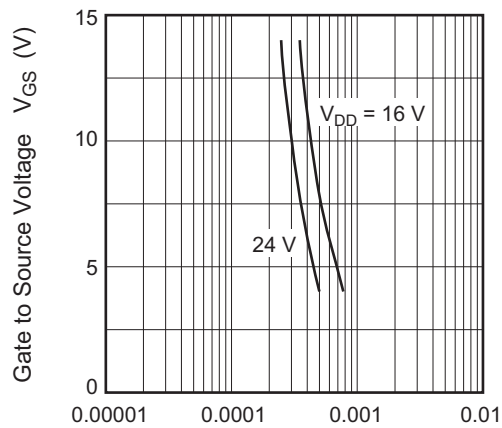
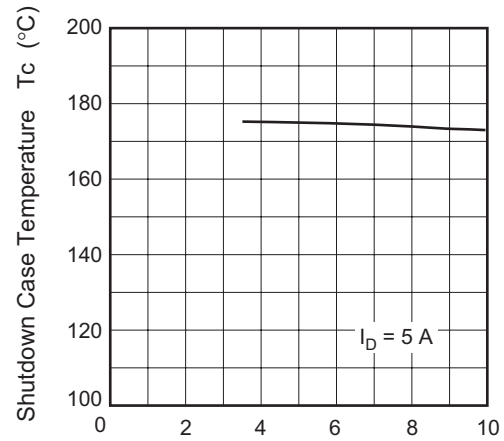
Drain Source Saturation Voltage vs. Gate to Source Voltage



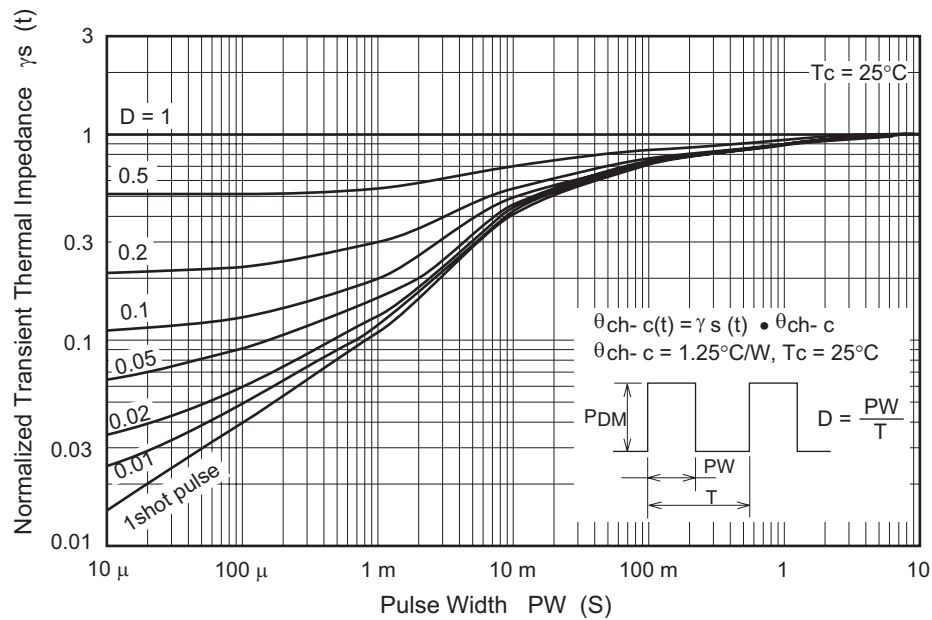
Static Drain to Source State Resistance vs. Drain Current



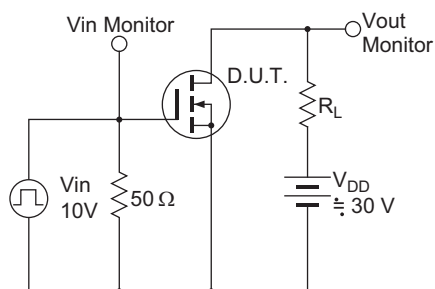


Gate to Source Voltage vs.
Shutdown Time of Load-Short TestShutdown Time of Load-Short Test P_w (S)Shutdown Case Temperature vs.
Gate to Source VoltageGate to Source Voltage V_{GS} (V)

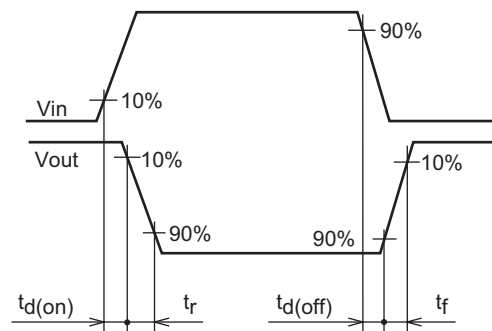
Normalized Transient Thermal Impedance vs. Pulse Width



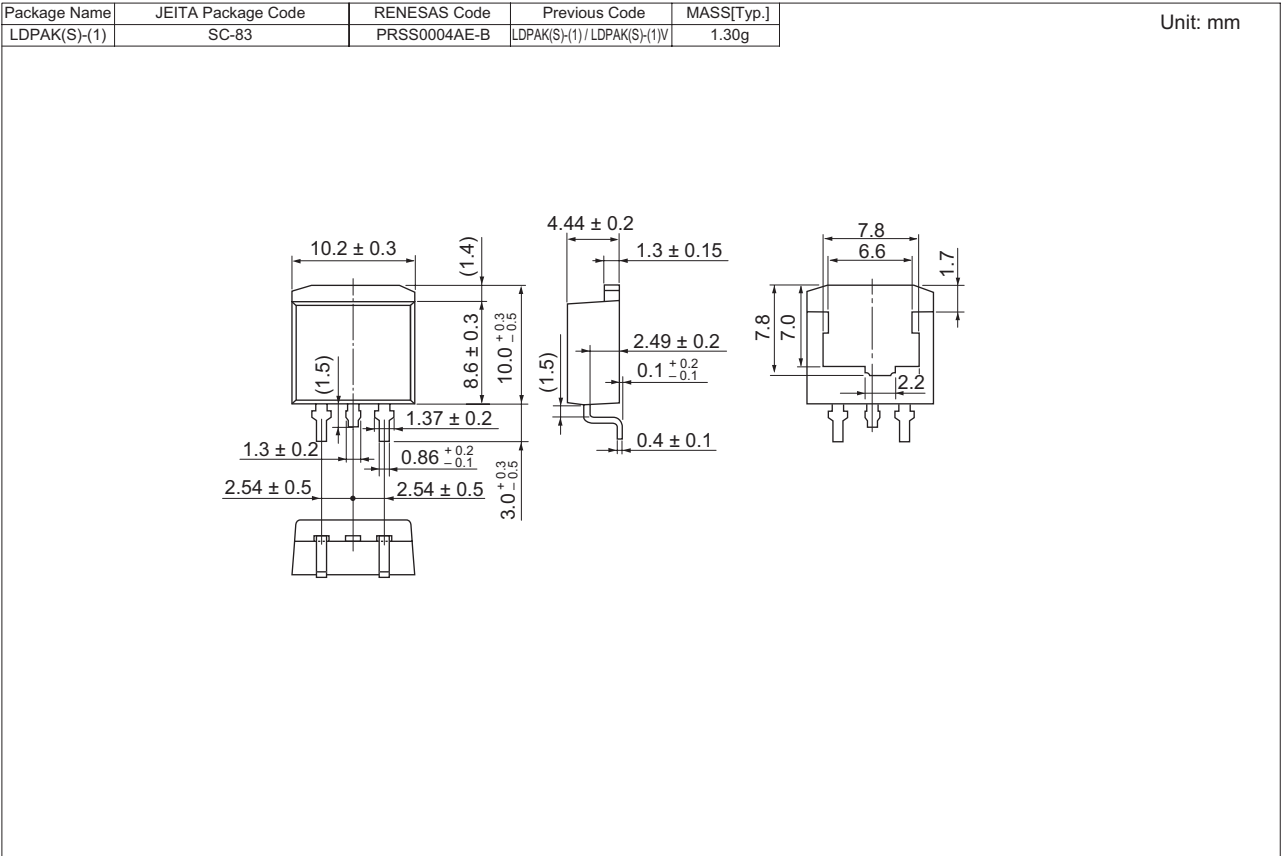
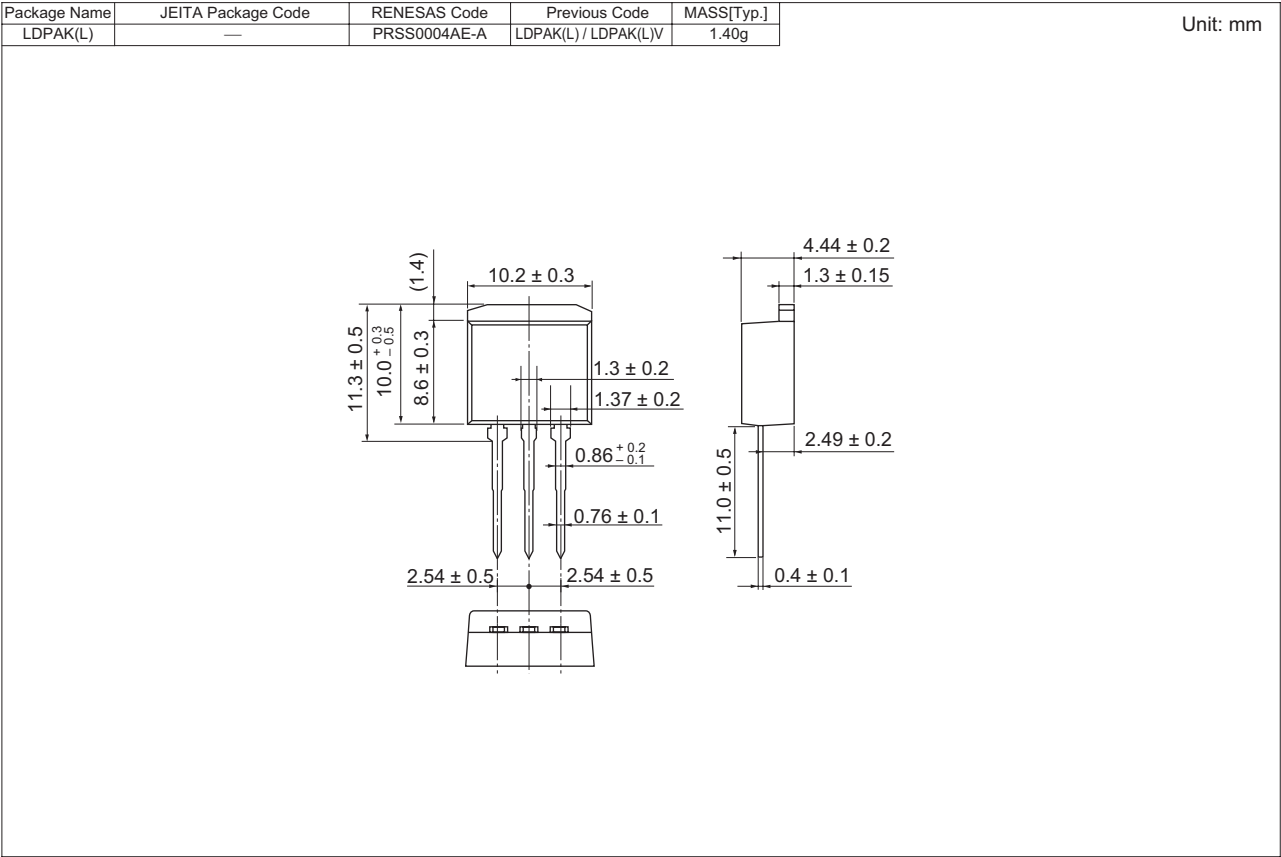
Switching Time Test Circuit



Waveform



Package Dimensions



Ordering Information

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

Notes:

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