

To our customers,

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## Old Company Name in Catalogs and Other Documents

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April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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## HAF2017(L), HAF2017(S)

Silicon N Channel Power MOS FET  
Power Switching

REJ03G0234-0200Z  
(Previous ADE-208-1637 (Z))  
Rev.2.00  
Apr.13.2004

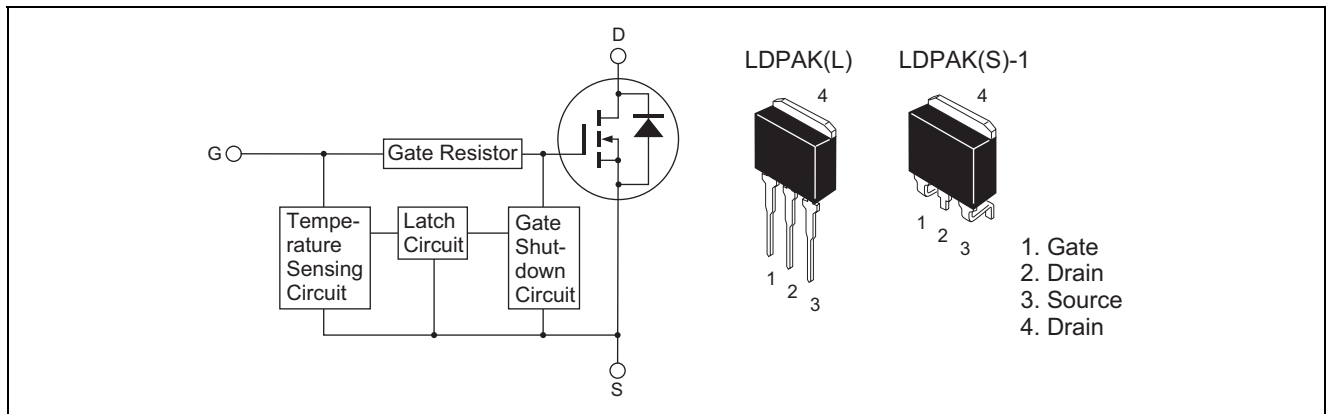
### Descriptions

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

### Features

- Logic level operation (4 to 6 V Gate drive)
- High endurance capability against to the short circuit
- Built-in the over temperature shutdown circuit
- Latch type shutdown operation (Need 0 voltage recovery)

### Outline



## HAF2017(L), HAF2017(S)

### Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Rating	Unit
Drain to source voltage	V <sub>DSS</sub>	60	V
Gate to source voltage	V <sub>GSS</sub>	16	V
Gate to source voltage	V <sub>GSS</sub>	-2.5	V
Drain current	I <sub>D</sub>	20	A
Drain peak current	I <sub>D</sub> (pulse) <sup>Note1</sup>	40	A
Body-drain diode reverse drain current	I <sub>DR</sub>	20	A
Channel dissipation	P <sub>ch</sub> <sup>Note2</sup>	50	W
Channel temperature	T <sub>ch</sub>	150	°C
Storage temperature	T <sub>stg</sub>	-55 to +150	°C

Notes: 1. PW ≤ 10μs, duty cycle ≤ 1%  
2. Value at T<sub>ch</sub> = 25°C

### Typical Operation Characteristics

(Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Input voltage	V <sub>IH</sub>	3.5	—	—	V	
Input voltage	V <sub>IL</sub>	—	—	1.2	V	
Input current (Gate non shut down)	I <sub>IH1</sub>	—	—	100	μA	V <sub>i</sub> = 8V, V <sub>DS</sub> = 0
Input current (Gate non shut down)	I <sub>IH2</sub>	—	—	50	μA	V <sub>i</sub> = 3.5V, V <sub>DS</sub> = 0
Input current (Gate non shut down)	I <sub>IL</sub>	—	—	1	μA	V <sub>i</sub> = 1.2V, V <sub>DS</sub> = 0
Input current (Gate shut down)	I <sub>IH(sd)1</sub>	—	0.8	—	mA	V <sub>i</sub> = 8V, V <sub>DS</sub> = 0
Input current (Gate shut down)	I <sub>IH(sd)2</sub>	—	0.35	—	mA	V <sub>i</sub> = 3.5V, V <sub>DS</sub> = 0
Shutdown temperature	T <sub>sd</sub>	—	175	—	°C	Channel temperature
Gate operation voltage	V <sub>OP</sub>	3.5	—	12	V	

## Electrical Characteristics

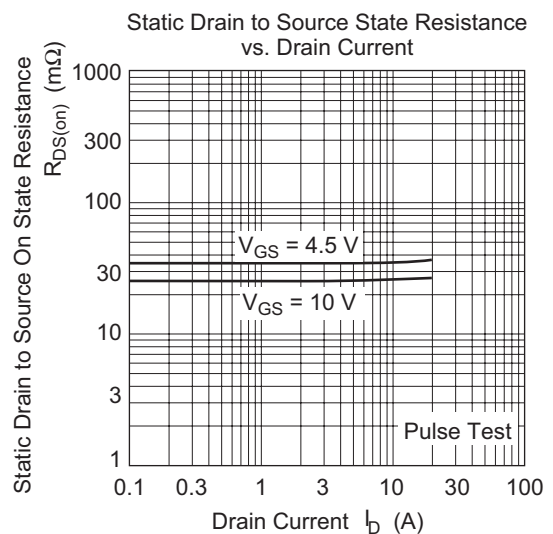
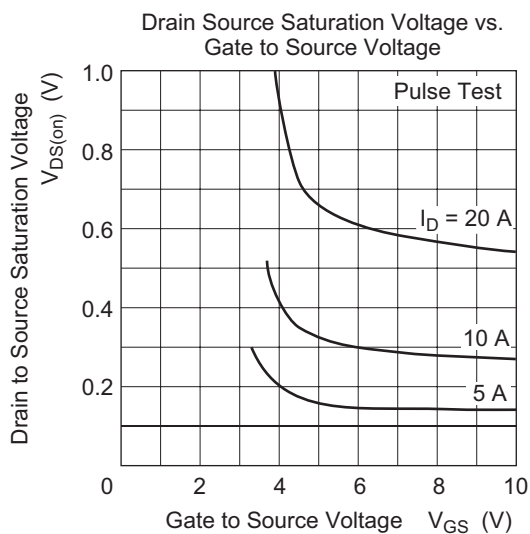
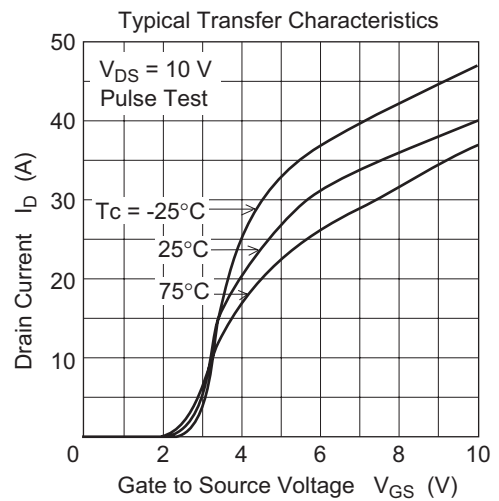
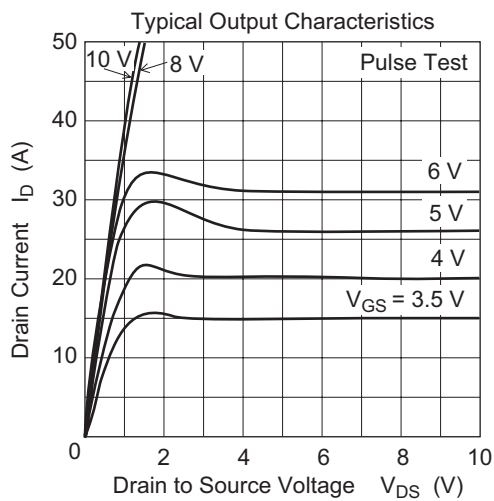
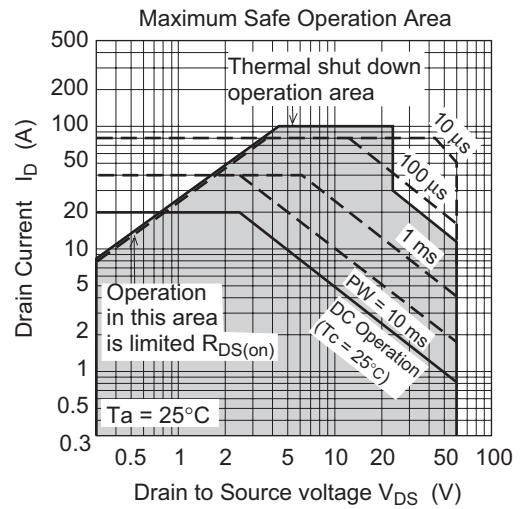
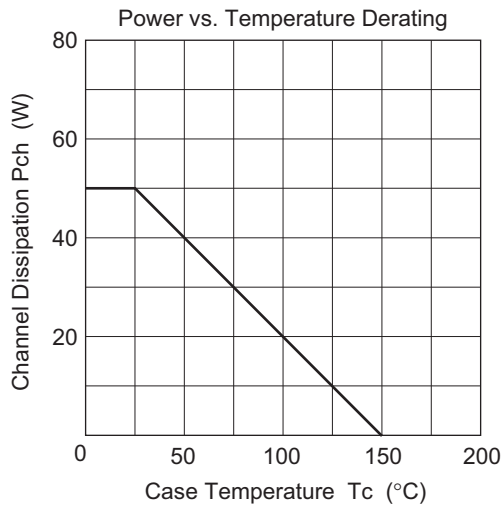
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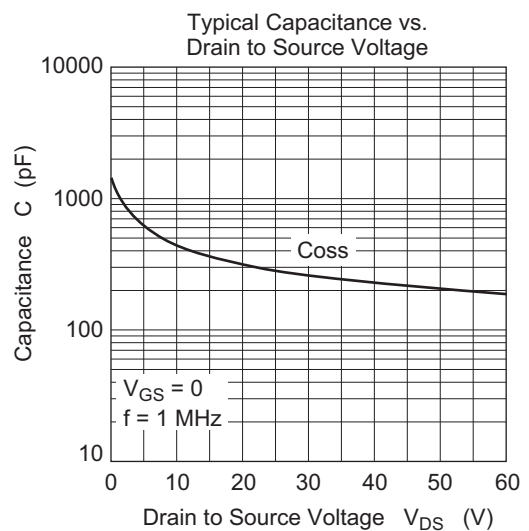
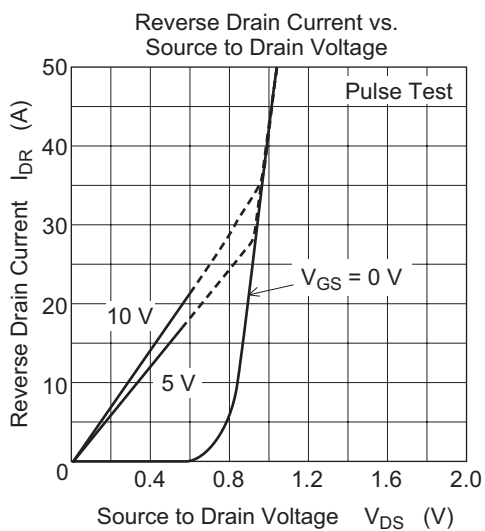
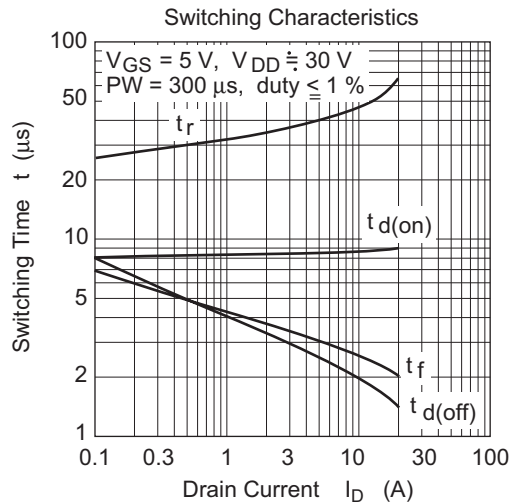
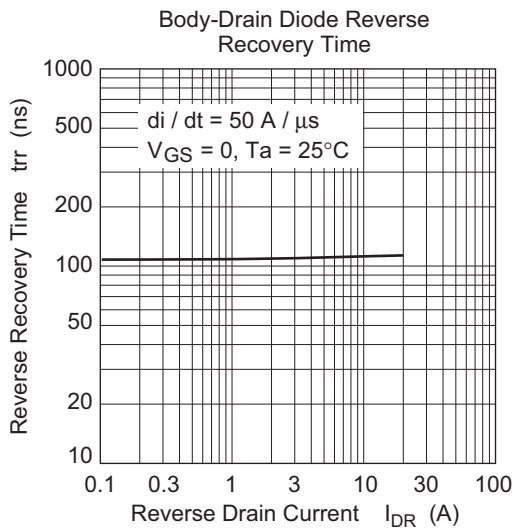
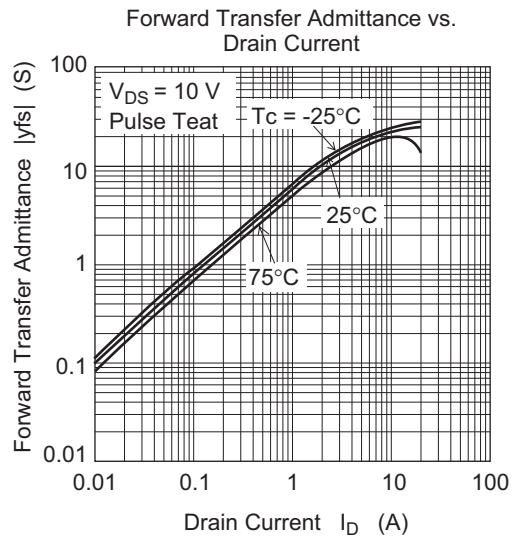
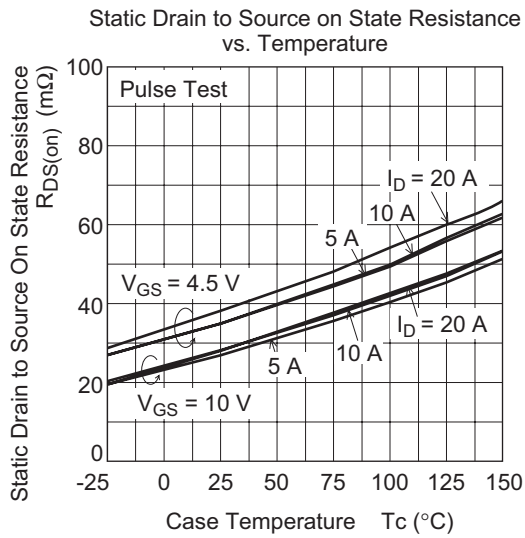
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Darin current	$I_{D1}$	1	—	—	A	$V_{GS} = 3.5\text{ V}, V_{DS} = 2\text{ V}$
Darin current	$I_{D2}$	—	—	10	mA	$V_{GS} = 1.2\text{ V}, V_{DS} = 2\text{ V}$
Drain to source breakdown voltage	$V_{(BR)DSS}$	60	—	—	V	$I_D = 10\text{ mA}, V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	16	—	—	V	$I_G = 800\text{ }\mu\text{A}, V_{DS} = 0$
	$V_{(BR)GSS}$	-2.5	—	—	V	$I_G = -100\text{ }\mu\text{A}, V_{DS} = 0$
Gate to source leak current	$I_{GSS1}$	—	—	100	$\mu\text{A}$	$V_{GS} = 8\text{ V}, V_{DS} = 0$
	$I_{GSS2}$	—	—	50	$\mu\text{A}$	$V_{GS} = 3.5\text{ V}, V_{DS} = 0$
	$I_{GSS3}$	—	—	1	$\mu\text{A}$	$V_{GS} = 1.2\text{ V}, V_{DS} = 0$
	$I_{GSS4}$	—	—	-100	$\mu\text{A}$	$V_{GS} = -2.4\text{ V}, V_{DS} = 0$
Input current (shut down)	$I_{GS(OP)1}$	—	0.8	—	mA	$V_{GS} = 8\text{ V}, V_{DS} = 0$
	$I_{GS(OP)2}$	—	0.35	—	mA	$V_{GS} = 3.5\text{ V}, V_{DS} = 0$
Zero gate voltage drain current	$I_{DSS}$	—	—	10	$\mu\text{A}$	$V_{DS} = 60\text{ V}, V_{GS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	1.4	—	2.6	V	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$
Forward transfer admittance	$ y_{fs} $	6	21	—	S	$I_D = 10\text{ A}, V_{DS} = 10\text{ V}$ <sup>Note3</sup>
Static drain to source on state resistance	$R_{DS(on)}$	—	35	53	m $\Omega$	$I_D = 10\text{ A}, V_{GS} = 4.5\text{ V}$ <sup>Note3</sup>
	$R_{DS(on)}$	—	27	43	m $\Omega$	$I_D = 10\text{ A}, V_{GS} = 10\text{ V}$ <sup>Note3</sup>
Output capacitance	$C_{oss}$	—	460	—	pF	$V_{DS} = 10\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$
Turn-on delay time	$t_{d(on)}$	—	8.7	—	$\mu\text{s}$	$V_{GS} = 5\text{ V}, I_D = 10\text{ A}, R_L = 3\text{ }\Omega$
Rise time	$t_r$	—	44.6	—	$\mu\text{s}$	
Turn-off delay time	$t_{d(off)}$	—	2	—	$\mu\text{s}$	
Fall time	$t_f$	—	2.6	—	$\mu\text{s}$	
Body-drain diode forward voltage	$V_{DF}$	—	0.9	—	V	$I_F = 20\text{ A}, V_{GS} = 0$
Body-drain diode reverse recovery time	$t_{rr}$	—	120	—	ns	$I_F = 20\text{ A}, V_{GS} = 0,$ $di_F/dt = 50\text{ A}/\mu\text{s}$
Over load shut down operation time <sup>Note4</sup>	$t_{os1}$	—	0.97	—	ms	$V_{GS} = 5\text{ V}, V_{DD} = 16\text{ V}$
	$t_{os2}$	—	0.57	—	ms	$V_{GS} = 5\text{ V}, V_{DD} = 24\text{ V}$

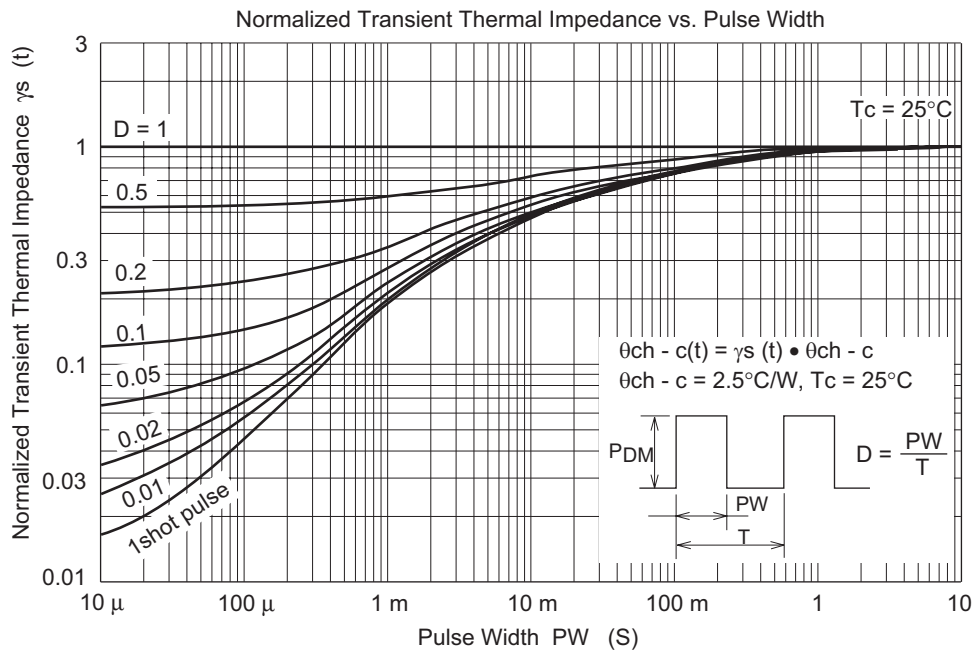
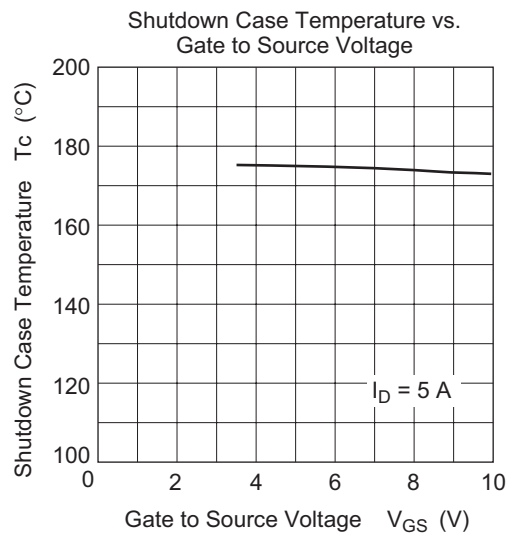
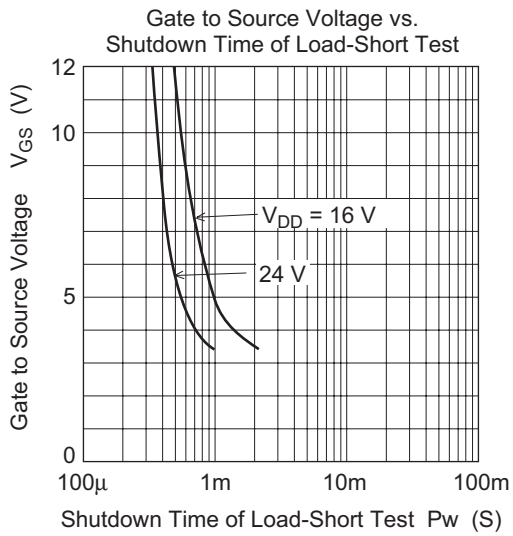
Notes: 3. Pulse test

4. Include the time shift based on increasing of channel temperature when operate under over load condition.

Main Characteristics



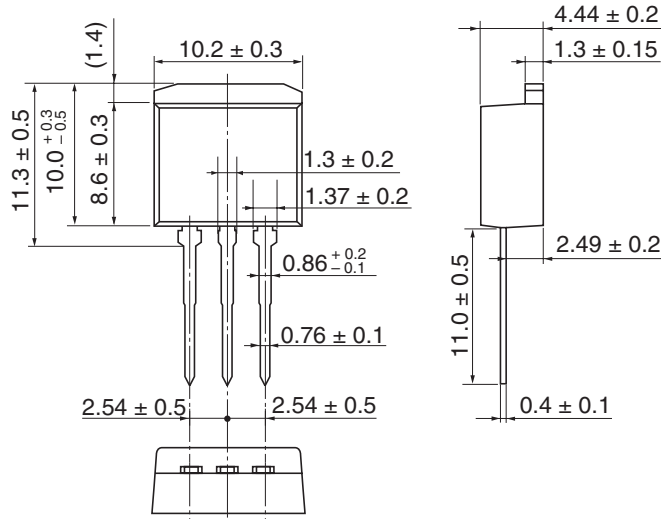






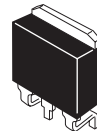
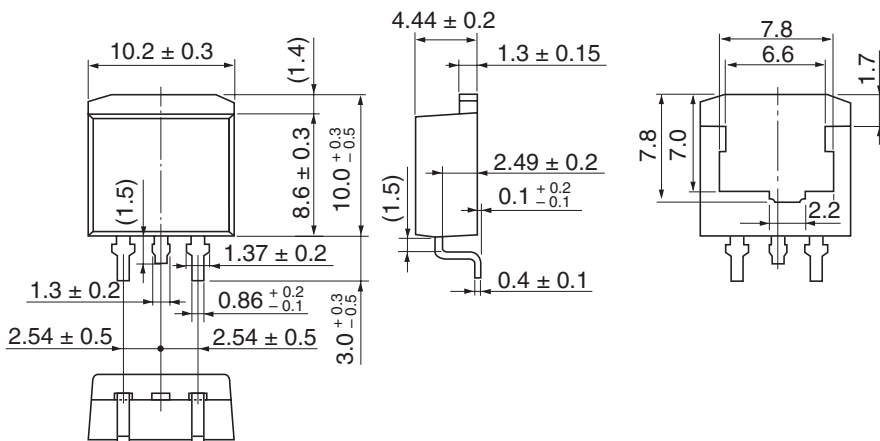
Package Dimensions

As of January, 2003  
Unit: mm



Package Code	LDPAK (L)
JEDEC	—
JEITA	—
Mass (reference value)	1.40 g

As of January, 2003  
Unit: mm



Package Code	LDPAK (S)-(1)
JEDEC	—
JEITA	—
Mass (reference value)	1.30 g

## HAF2017(L), HAF2017(S)

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Part Name	Quantity	Shipping Container
HAF2017-90L	Max: 50 pcs/ sack	Sack
HAF2017-90S	Max: 50 pcs/ sack	Sack
HAF2017-90STL	1000 pcs/ Reel	Embossed tape
HAF2017-90STR	1000 pcs/ Reel	Embossed tape

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