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Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

Cautions

Keep safety first in your circuit designs!

1. Renesas Technology Corporation puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage.

Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

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H7N1002LD, H7N1002LS, H7N1002LM

Silicon N Channel MOS FET
High Speed Power Switching

RENESAS

ADE-208-1573E (Z)

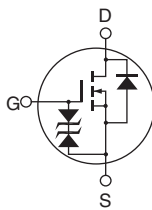
6th. Edition
Aug. 2002

Features

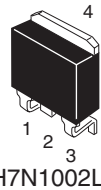
- Low on-resistance
- $R_{DS(on)} = 8 \text{ m}\Omega$ typ.
- Low drive current
- Available for 4.5 V gate drive

Outline

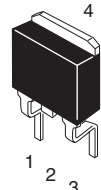
LDBPAK



H7N1002LD



H7N1002LS



H7N1002LM

1. Gate
2. Drain
3. Source
4. Drain

Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DSS}	100	V
Gate to source voltage	V_{GSS}	±20	V
Drain current	I_D	75	A
Drain peak current	$I_{D(pulse)}$ ^{Note1}	300	A
Body-drain diode reverse drain current	I_{DR}	75	A
Avalanche current	I_{AP} ^{Note3}	50	A
Avalanche energy	E_{AR} ^{Note3}	166	mJ
Channel dissipation	P_{ch} ^{Note2}	100	W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	-55 to +150	°C

Notes: 1. $PW \leq 10 \mu s$, duty cycle $\leq 1 \%$
2. Value at $T_c = 25^\circ C$
3. Value at $T_{ch} = 25^\circ C$, $R_g \geq 50 \Omega$

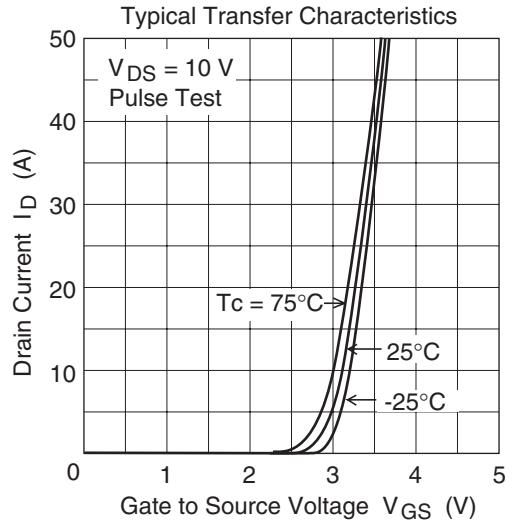
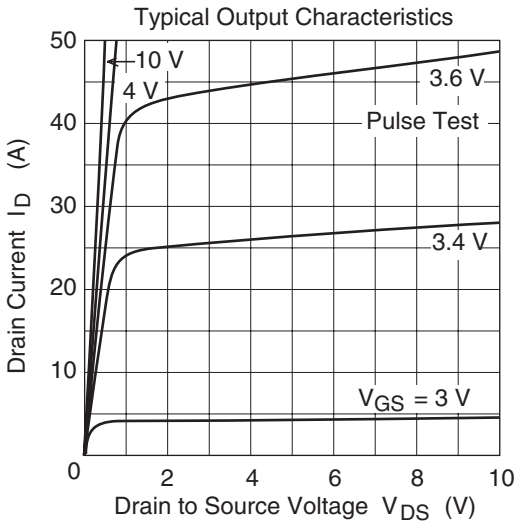
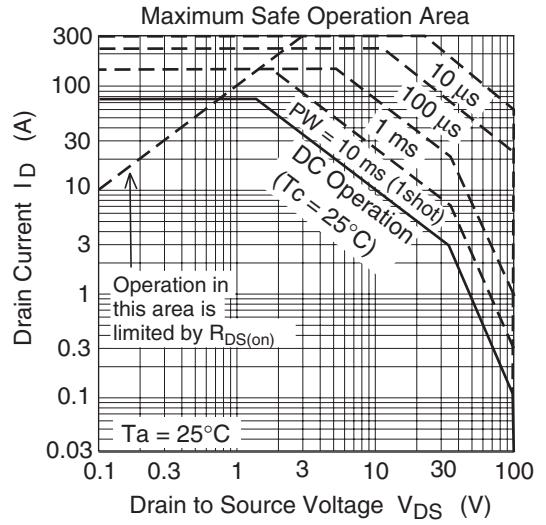
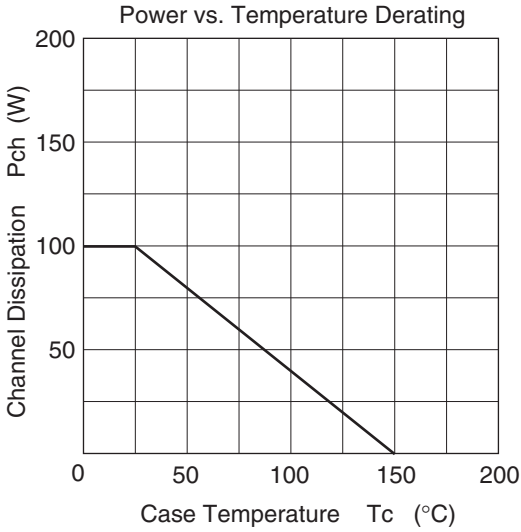
Electrical Characteristics

(Ta = 25°C)

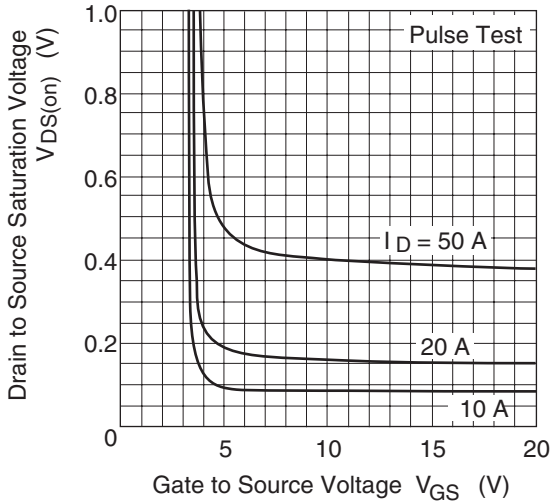
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	100	—	—	V	$I_D = 10 \text{ mA}, V_{GS} = 0$
Gate to source breakdown Voltage	$V_{(BR)GSS}$	±20	—	—	V	$I_G = \pm 100 \text{ } \mu\text{A}, V_{DS} = 0$
Gate to source leak current	I_{GSS}	—	—	±10	μA	$V_{GS} = \pm 16 \text{ V}, V_{DS} = 0$
Zero gate voltage drain current	I_{DSS}	—	—	10	μA	$V_{DS} = 100 \text{ V}, V_{GS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	1.0	—	2.5	V	$I_D = 1 \text{ mA}, V_{DS} = 10 \text{ V}^{*1}$
Static drain to source on state resistance	$R_{DS(on)}$	—	8	10	mΩ	$I_D = 37.5 \text{ A}, V_{GS} = 10 \text{ V}^{*1}$
		—	10	15	mΩ	$I_D = 37.5 \text{ A}, V_{GS} = 4.5 \text{ V}^{*1}$
Forward transfer admittance	$ y_{fs} $	57	95	—	S	$I_D = 37.5 \text{ A}, V_{DS} = 10 \text{ V}^{*1}$
Input capacitance	Ciss	—	9700	—	pF	$V_{DS} = 10 \text{ V}$
Output capacitance	Coss	—	740	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	Crss	—	330	—	pF	$f = 1 \text{ MHz}$
Total gate charge	Qg	—	155	—	nc	$V_{DD} = 50 \text{ V}$
Gate to source charge	Qgs	—	35	—	nc	$V_{GS} = 10 \text{ V}$
Gate to drain charge	Qgd	—	33	—	nc	$I_D = 75 \text{ A}$
Turn-on delay time	$t_{d(on)}$	—	43	—	ns	$V_{GS} = 10 \text{ V}, I_D = 37.5 \text{ A}$
Rise time	t_r	—	245	—	ns	$R_L = 0.8 \text{ } \Omega$
Turn-off delay time	$t_{d(off)}$	—	130	—	ns	$R_g = 4.7 \text{ } \Omega$
Fall time	t_f	—	25	—	ns	
Body–drain diode forward voltage	V_{DF}	—	0.93	—	V	$I_F = 75 \text{ A}, V_{GS} = 0$
Body–drain diode reverse recovery time	t_{rr}	—	70	—	ns	$I_F = 75 \text{ A}, V_{GS} = 0$ $diF/dt = 100 \text{ A}/\mu\text{s}$

Notes: 1. Pulse test

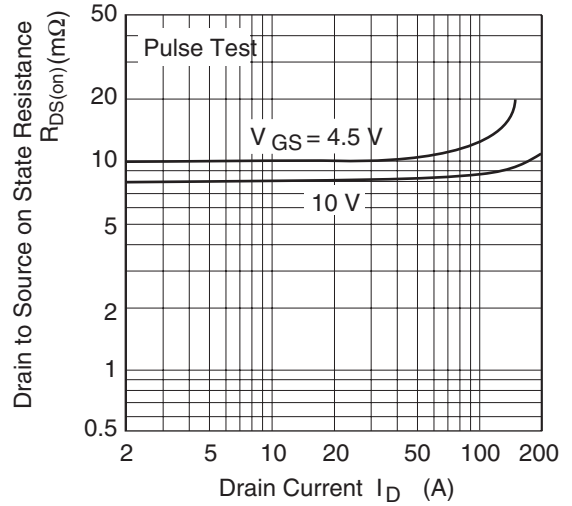
Main Characteristics



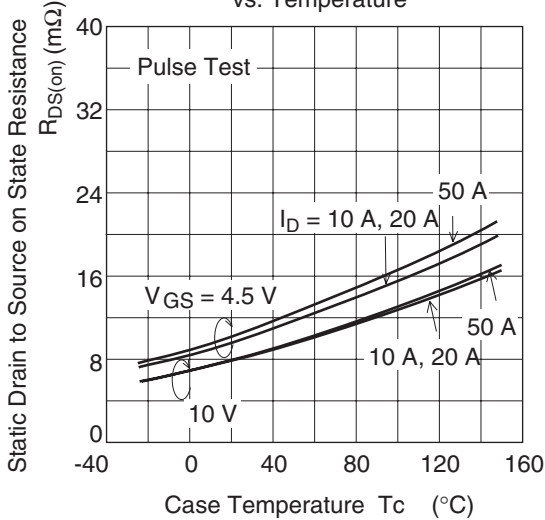
Drain to Source Saturation Voltage VS. Gate to Source Voltage



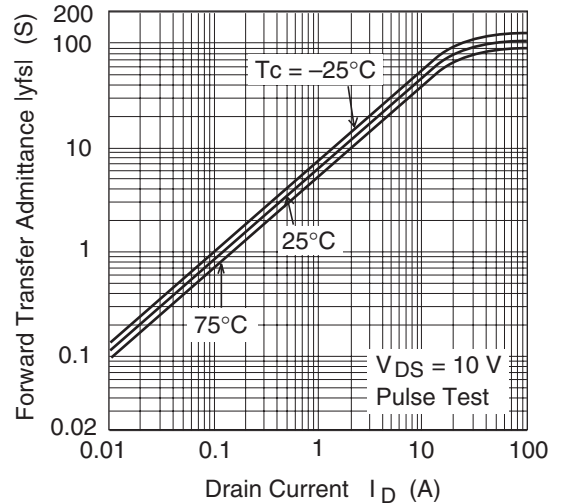
Static Drain to Source on State Resistance vs. Drain Current

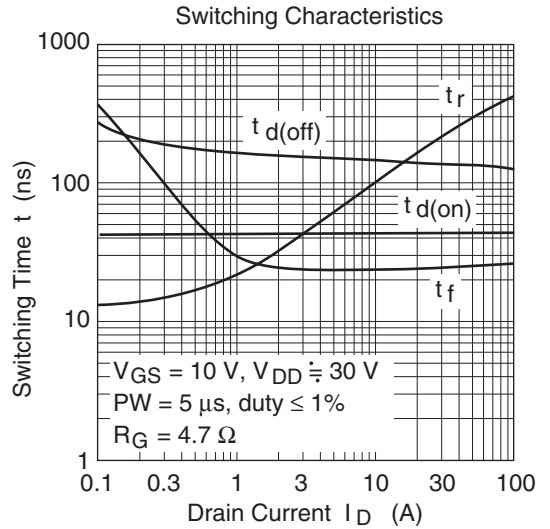
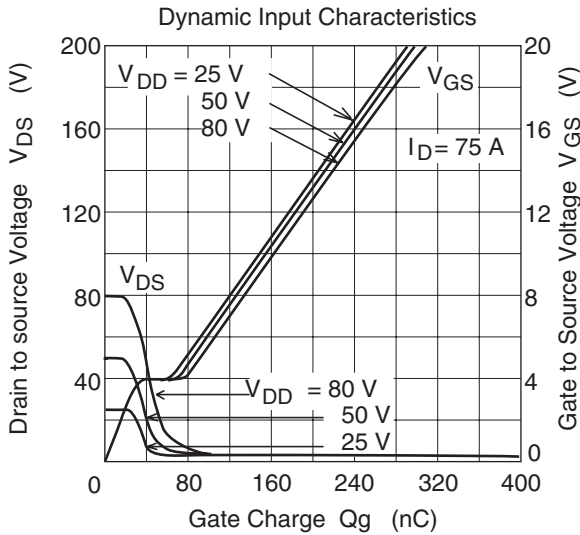
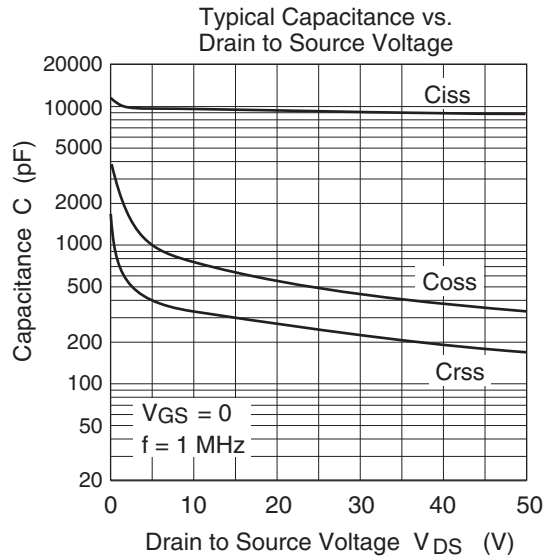
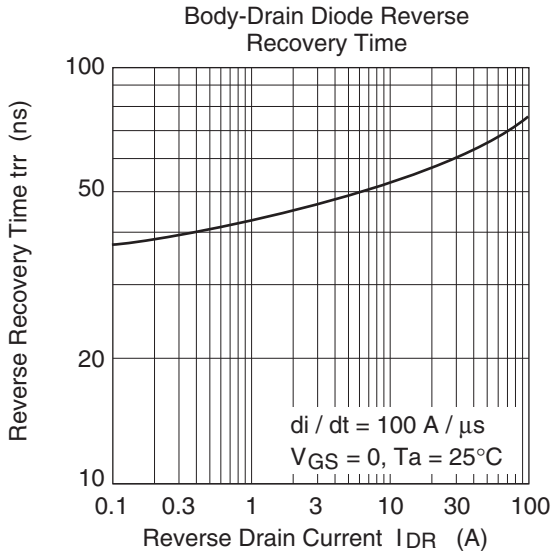


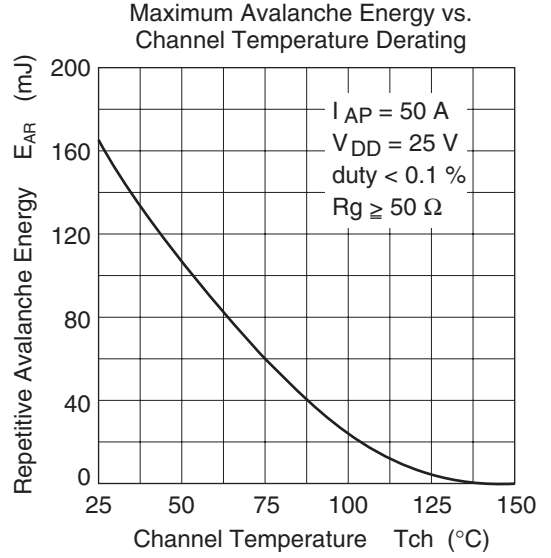
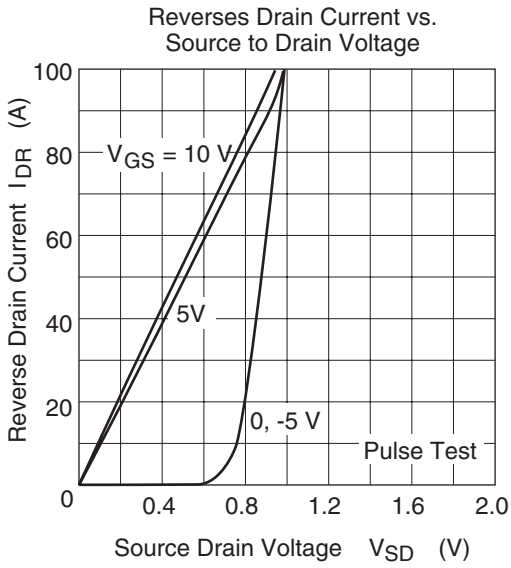
Static Drain to Source on State Resistance vs. Temperature



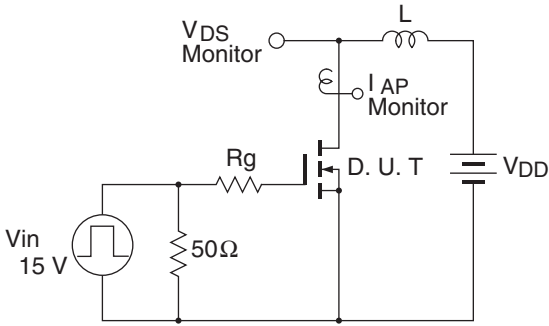
Forward Transfer Admittance vs. Drain Current





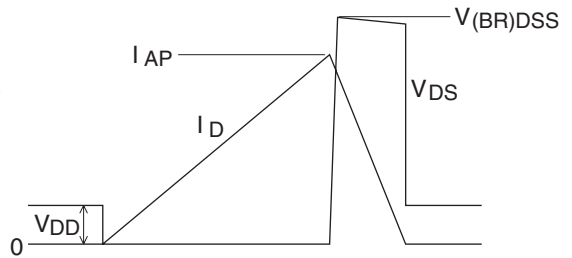


Avalanche Test Circuit

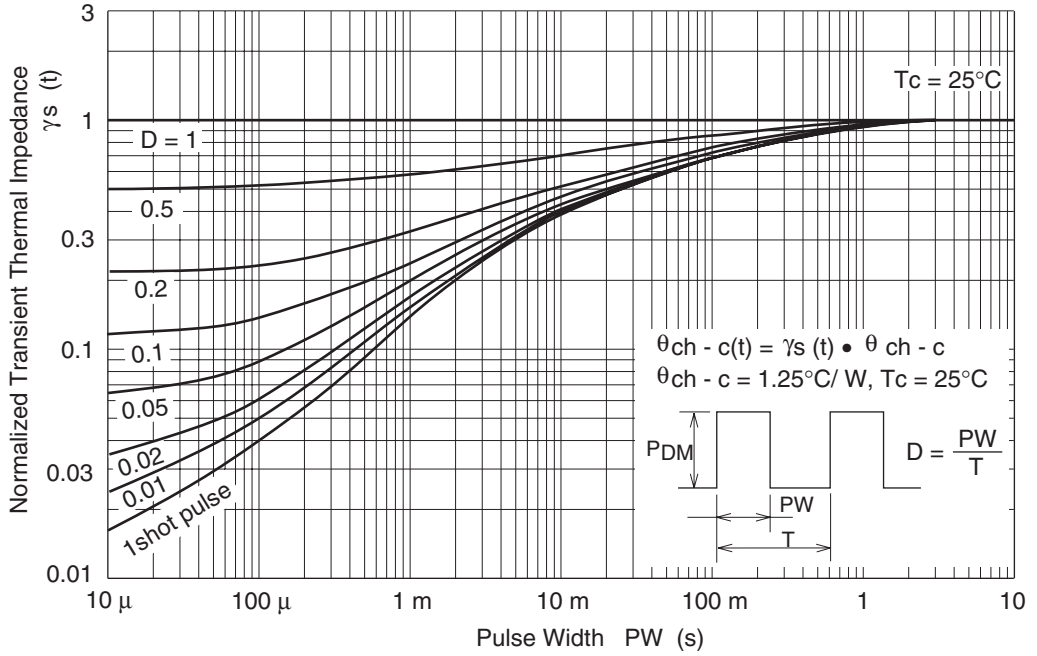


Avalanche Waveform

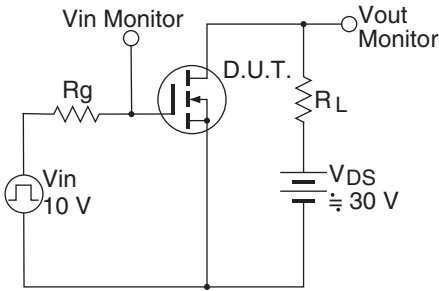
$$E_{AR} = \frac{1}{2} \cdot L \cdot I_{AP}^2 \cdot \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$



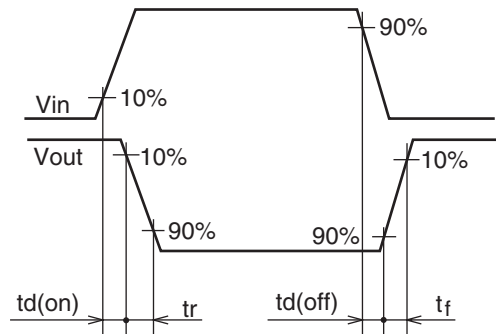
Normalized Transient Thermal Impedance vs. Pulse Width



Switching Time Test Circuit



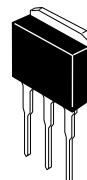
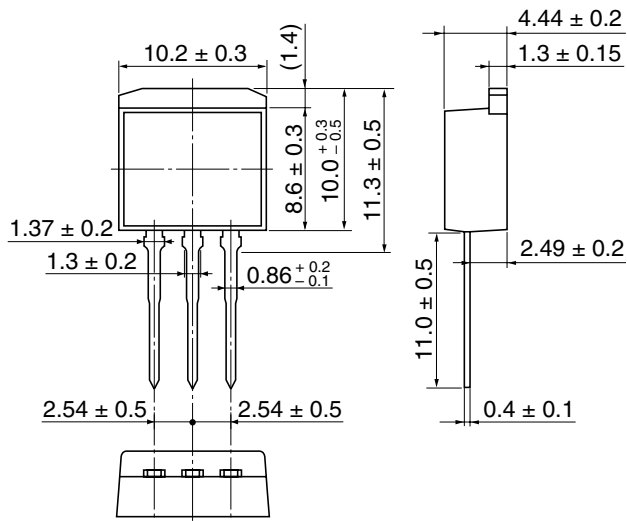
Switching Time Waveform



Package Dimensions

• H7N1002LD

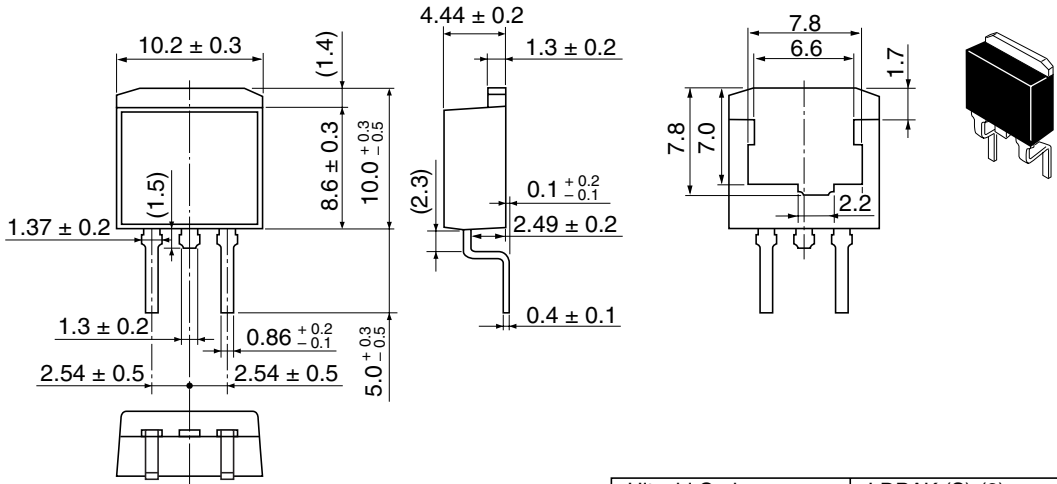
Unit: mm



Hitachi Code	LDBPAK (L)
JEDEC	—
JEITA	—
Mass (reference value)	1.4 g

• H7N1002LM

Unit: mm



Hitachi Code	LDBAK (S)-(2)
JEDEC	—
JEITA	—
Mass (reference value)	1.35 g

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Colophon 6.0



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