To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

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H7N1004LD, H7N1004LS, H7N1004LM

Silicon N-Channel MOSFET
High-Speed Power Switching

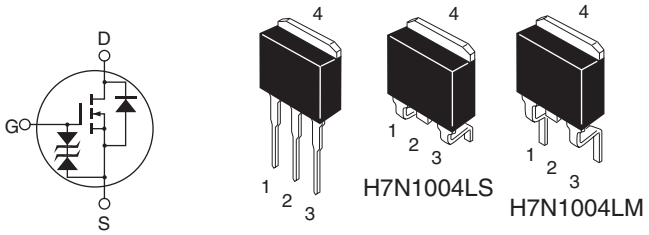
REJ03G0072-0600Z
(Previous ADE-208-1552E(Z))
Rev.6.00
Aug.27.2003

Features

- Low on-resistance
- $R_{DS(on)}$ = 25 mΩ typ.
- Low drive current
- Available for 4.5 V gate drive

Outline

LDPAK



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

Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Value	Unit
Drain to source voltage	V_{DSS}	100	V
Gate to source voltage	V_{GSS}	±20	V
Drain current	I_D	30	A
Drain peak current	I_D (pulse)[Note1]	100	A
Body-drain diode reverse drain current	I_{DR}	30	A
Avalanche current	I_{AP} [Note 3]	15	A
Avalanche energy	E_{AR} [Note 3]	22.5	mJ
Channel dissipation	Pch* [Note 2]	50	W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	–55 to +150	°C

Notes: 1. PW ≤ 10 µs, duty cycle ≤ 1%
2. Value at Tc = 25°C
3. Value at Tch = 25°C, Rg ≥ 50 Ω

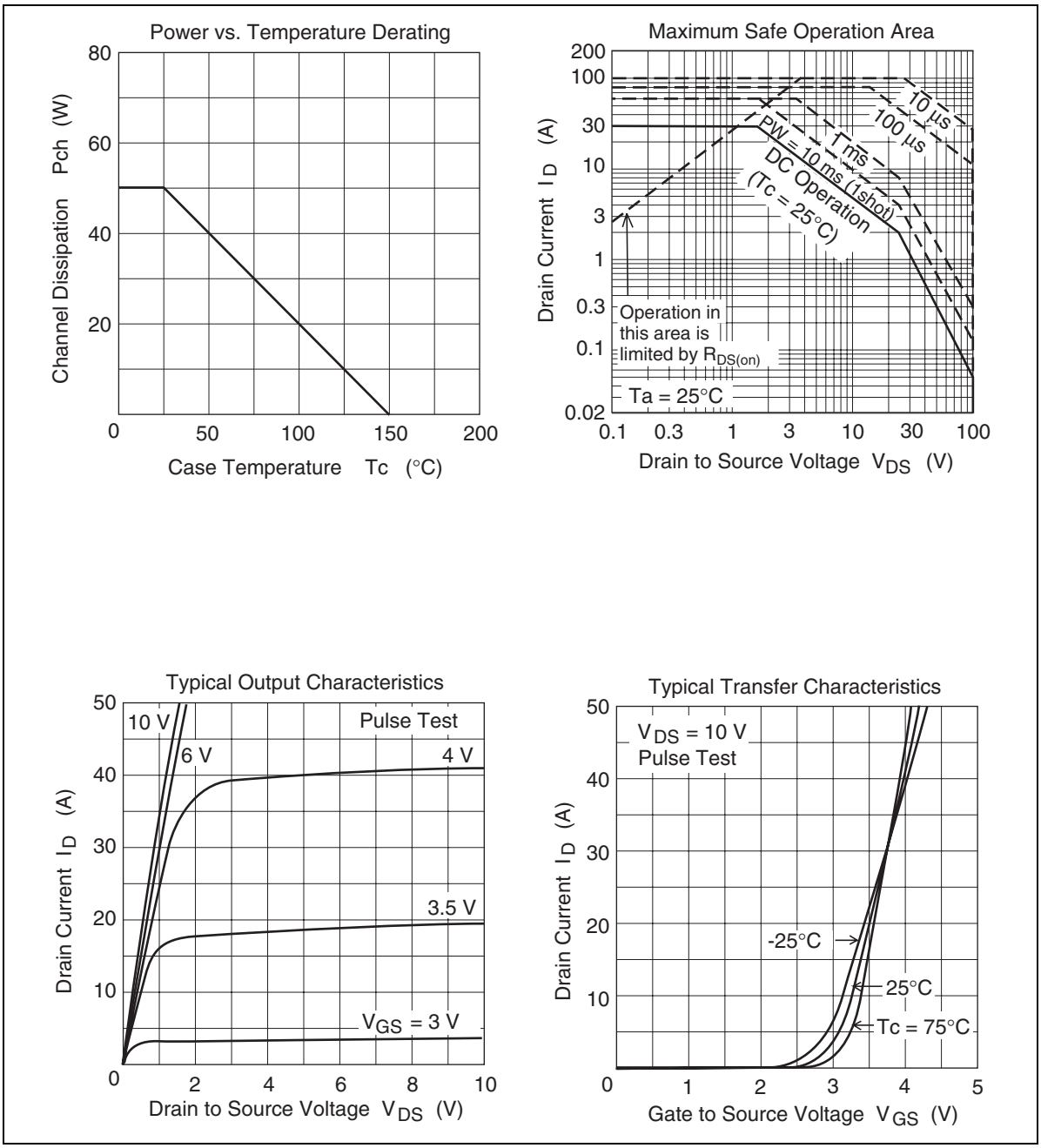
Electrical Characteristics

(Ta = 25°C)

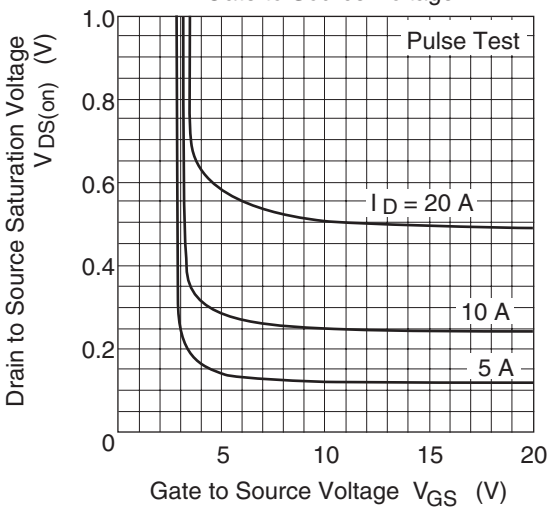
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	100	—	—	V	I_D = 10 mA, V_{GS} = 0
Gate to source breakdown voltage	$V_{(BR)GSS}$	±20	—	—	V	I_G = ±100 µA, V_{DS} = 0
Gate to source leak current	I_{GSS}	—	—	±10	µA	V_{GS} = ±16 V, V_{DS} = 0
Zero gate voltage drain current	I_{DSS}	—	—	10	µA	V_{DS} = 100 V, V_{GS} = 0
Gate to source cutoff voltage	$V_{GS(off)}$	1.5	—	2.5	V	I_D = 1 mA, V_{DS} = 10 V Note 1
Static drain to source on state resistance	$R_{DS(on)}$	—	25	35	mΩ	I_D = 15 A, V_{GS} = 10 V Note 1
		—	30	45	mΩ	I_D = 15 A, V_{GS} = 4.5 V Note 1
Forward transfer admittance	|yfs|	22	37	—	S	I_D = 15 A, V_{GS} = 10 V Note 1
Input capacitance	Ciss	—	2800	—	pF	V_{DS} = 10 V
Output capacitance	Coss	—	240	—	pF	V_{GS} = 0
Reverse transfer capacitance	Crss	—	140	—	pF	f = 1 MHz
Total gate charge	Qg	—	50	—	nC	V_{DD} = 50 V
Gate to source charge	Qgs	—	9	—	nC	V_{GS} = 10 V
Gate to drain charge	Qgd	—	11	—	nC	I_D = 30 A
Turn-on delay time	td(on)	—	23	—	ns	V_{GS} = 10 V, I_D = 15 A
Rise time	tr	—	120	—	ns	R_L = 2 Ω
Turn-off delay time	td(off)	—	70	—	ns	Rg = 4.7 Ω
Fall time	tf	—	9.5	—	ns	
Body-drain diode forward voltage	V_{DF}	—	0.9	—	V	I_F = 30 A, V_{GS} = 0
Body-drain diode reverse recovery time	trr	—	47	—	ns	I_F = 30 A, V_{GS} = 0 diF/dt = 100 A/µs

Notes: 1. Pulse test

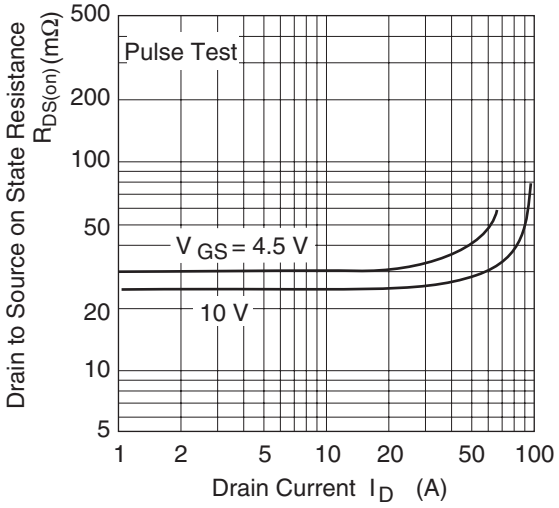
Main Characteristics



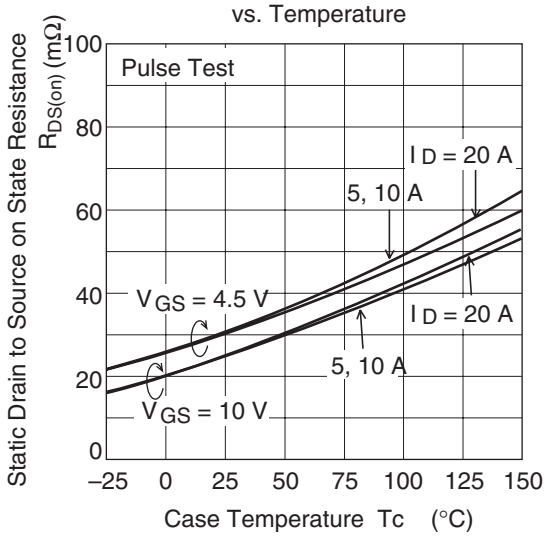
Drain to Source Saturation Voltage VS. Gate to Source Voltage



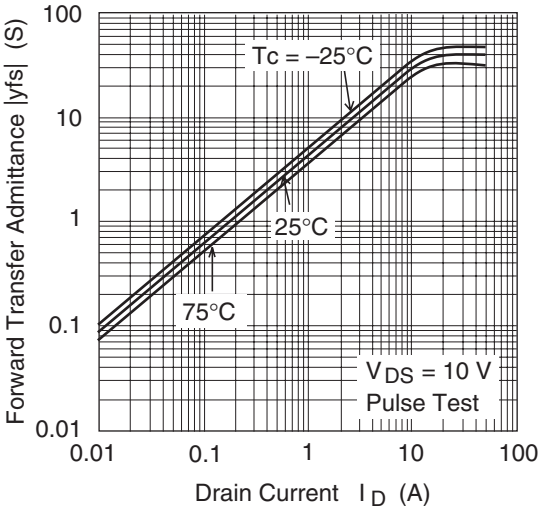
Static Drain to Source on State Resistance vs. Drain Current



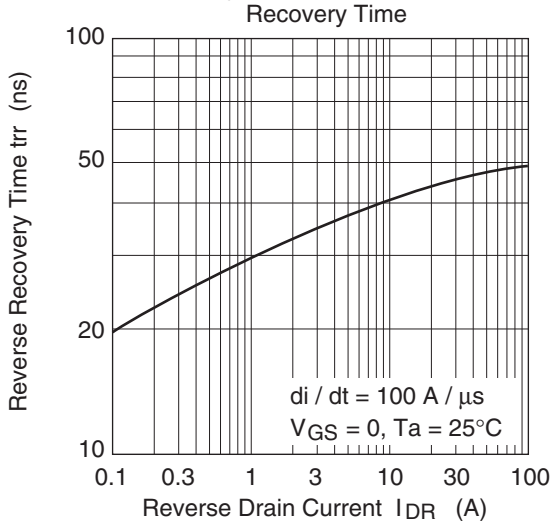
Static Drain to Source on State Resistance vs. Temperature



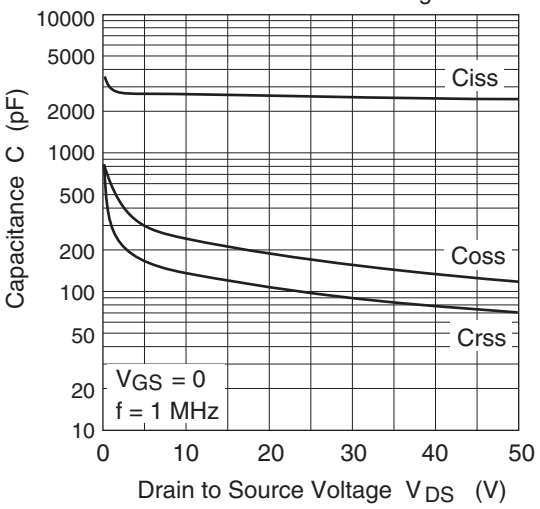
Forward Transfer Admittance vs. Drain Current



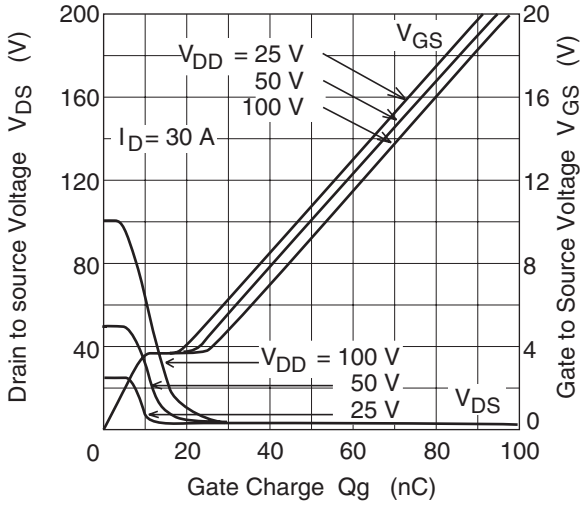
Body-Drain Diode Reverse Recovery Time



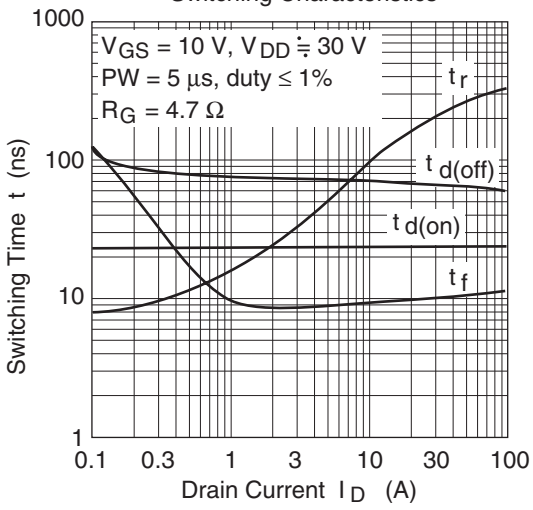
Typical Capacitance vs. Drain to Source Voltage



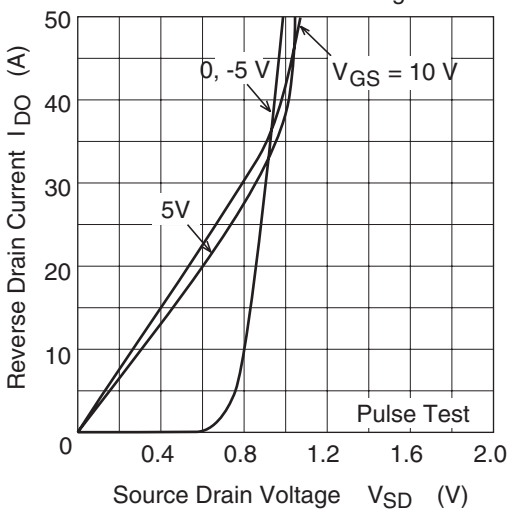
Dynamic Input Characteristics



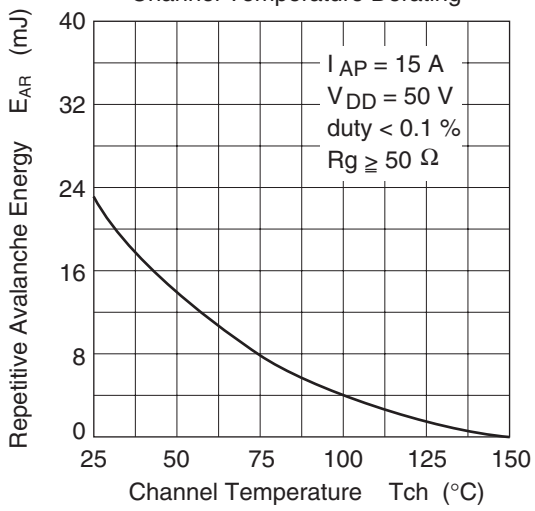
Switching Characteristics



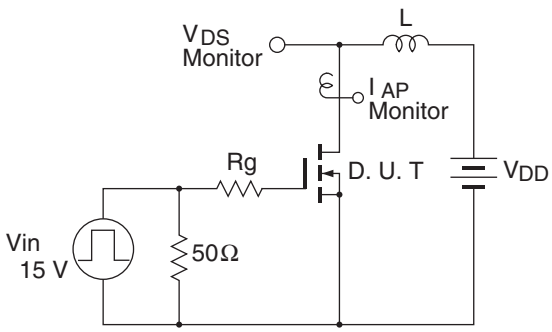
Reverse Drain Current vs. Source to Drain Voltage



Maximum Avalanche Energy vs. Channel Temperature Derating

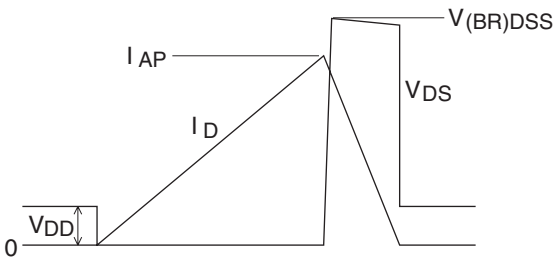


Avalanche Test Circuit

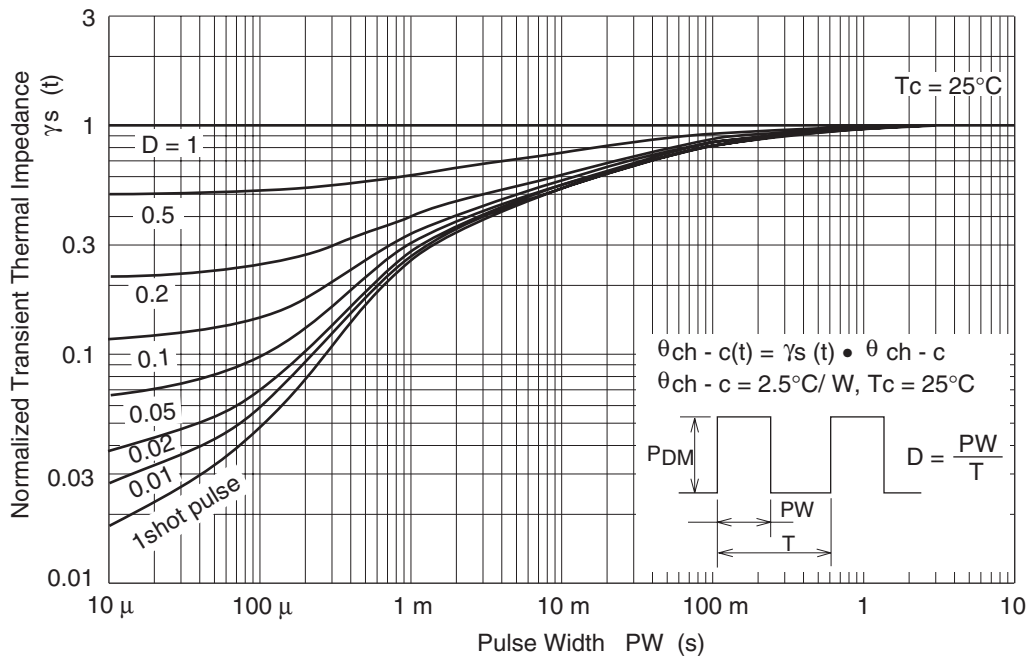


Avalanche Waveform

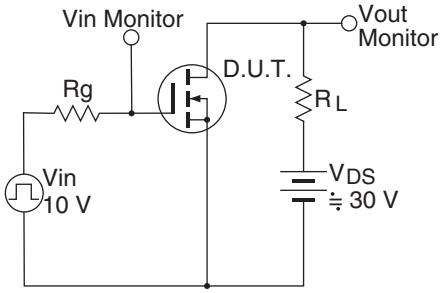
$$E_{AR} = \frac{1}{2} \bullet L \bullet I_{AP}^2 \bullet \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$



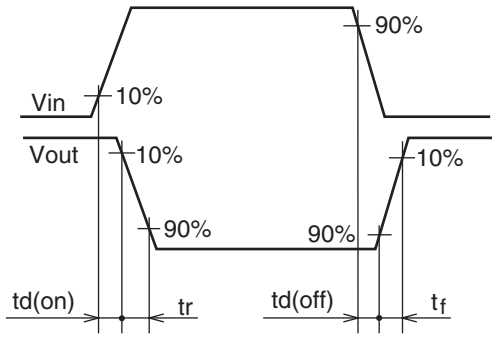
Normalized Transient Thermal Impedance vs. Pulse Width



Switching Time Test Circuit



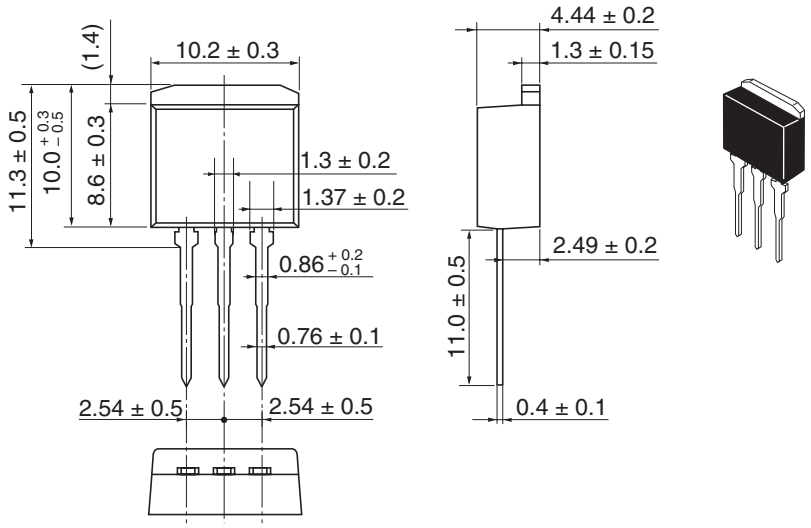
Switching Time Waveform



Package Dimensions

• H7N1004LD

As of January, 2003
Unit: mm

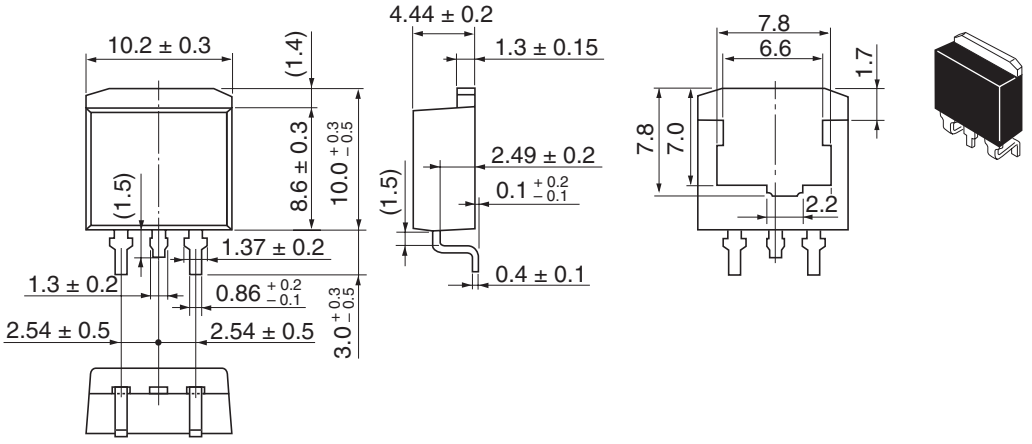


Package Code	LDPAK (L)
JEDEC	—
JEITA	—
Mass (reference value)	1.40 g

• H7N1004LS

As of January, 2003

Unit: mm

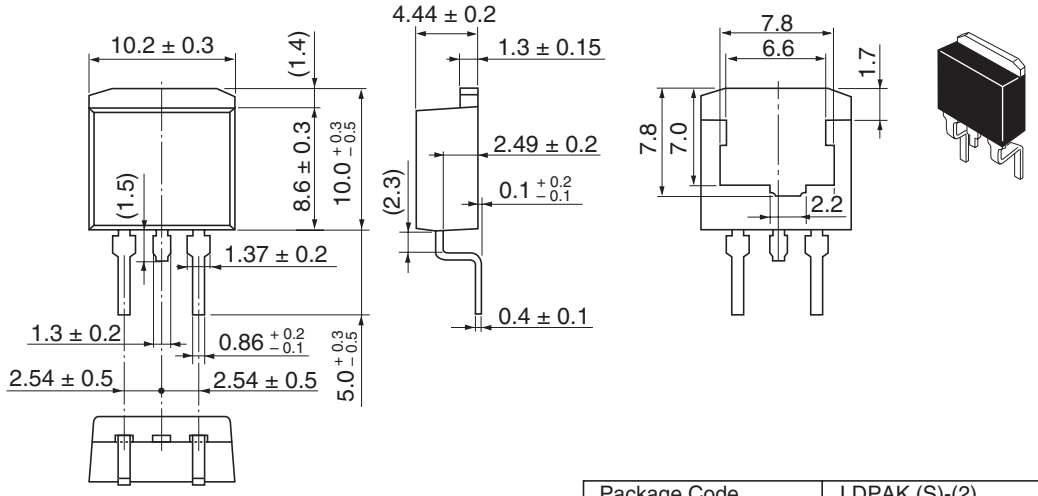


Package Code	LDPAK (S)-(1)
JEDEC	—
JEITA	—
Mass (reference value)	1.30 g

• H7N1004LM

As of January, 2003

Unit: mm



Package Code	LDPAK (S)-(2)
JEDEC	—
JEITA	—
Mass (reference value)	1.35 g

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