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

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2SK3461(L), 2SK3461(S)

Silicon N Channel MOS FET
High Speed Power Switching

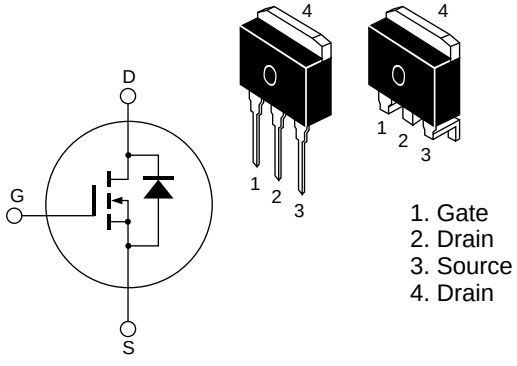
ADE-208-944 (Z)
1st. Edition
Mar. 2001

Features

- Low on-resistance
  $R_{DS(on)}$ = 4.3 mΩ typ.
- 4 V gate drive device
- High speed switching

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}	60	V
Gate to source voltage	V_{GSS}	±20	V
Drain current	I_D	85	A
Drain peak current	$I_{D\ (pulse)}$ Note 1	340	A
Body-drain diode reverse drain current	I_{DR}	85	A
Avalanche current	I_{AP} Note 3	60	A
Avalanche energy	E_{AR} Note 3	308	mJ
Channel dissipation	Pch Note 2	110	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

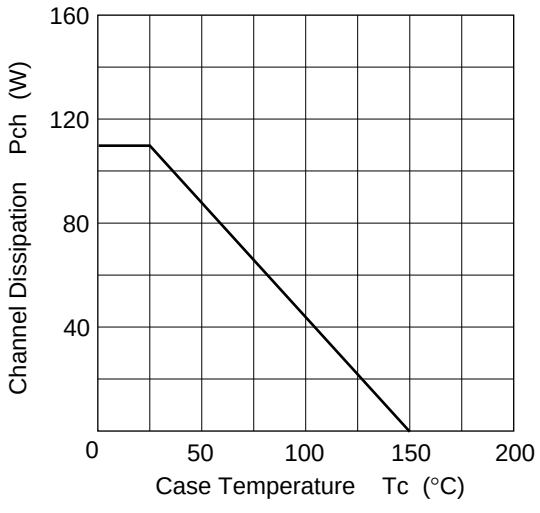
Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	60	—	—	V	I_D = 10 mA, V_{GS} = 0
Gate to source leak current	I_{DSS}	—	—	10	µA	V_{DS} = 60 V, V_{GS} = 0
Zero gate voltage drain current	I_{GSS}	—	—	±0.1	µA	V_{GS} = ±20 V, V_{DS} = 0
Gate to source cutoff voltage	$V_{GS(off)}$	1.0	—	2.5	V	V_{DS} = 10 V, I_D = 1 mA Note 1
Forward transfer admittance	$\|y_{fs}\|$	55	90	—	S	I_D = 45 A, V_{DS} = 10 V Note 1
Static drain to source on state resistance	$R_{DS(on)}$	—	4.3	5.5	mΩ	I_D = 45 A, V_{GS} = 10 V Note 1
	$R_{DS(on)}$	—	6.0	9.0	mΩ	I_D = 45 A, V_{GS} = 4 V Note 1
Input capacitance	Ciss	—	9770	—	pF	V_{DS} = 10 V
Output capacitance	Coss	—	1340	—	pF	V_{GS} = 0
Reverse transfer capacitance	Crss	—	470	—	pF	f = 1 MHz
Total gate charge	Qg	—	180	—	nc	V_{DD} = 50 V
Gate to source charge	Qgs	—	32	—	nc	V_{GS} = 10 V
Gate to drain charge	Qgd	—	36	—	nc	I_D = 85 A
Turn-on delay time	td(on)	—	53	—	ns	V_{GS} = 10 V
Rise time	tr	—	320	—	ns	I_D = 45 A
Turn-off delay time	td(off)	—	700	—	ns	R_L = 0.67 Ω
Fall time	tf	—	380	—	ns	
Body-drain diode forward voltage	V_{DF}	—	1.0	—	V	I_F = 85 A, V_{GS} = 0
Body-drain diode reverse recovery time	trr	—	70	—	ns	I_F = 85 A, V_{GS} = 0 diF/dt = 50 A/µs

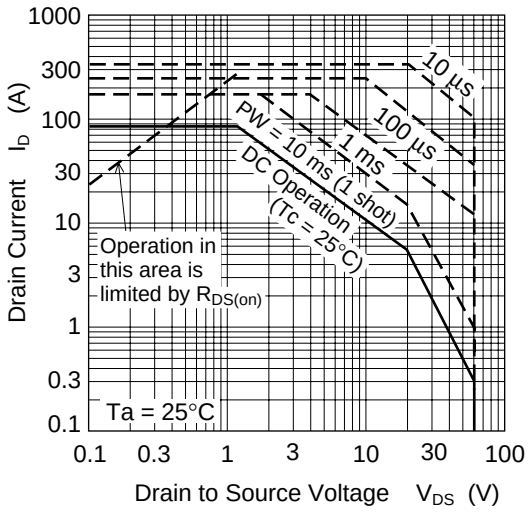
Note: 1. Pulse test

Main Characteristics

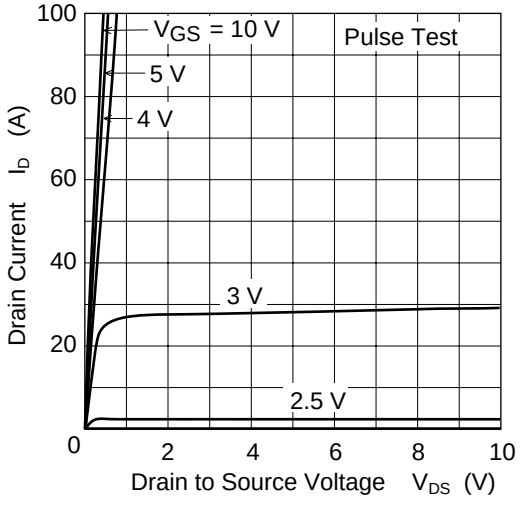
Power vs. Temperature Derating



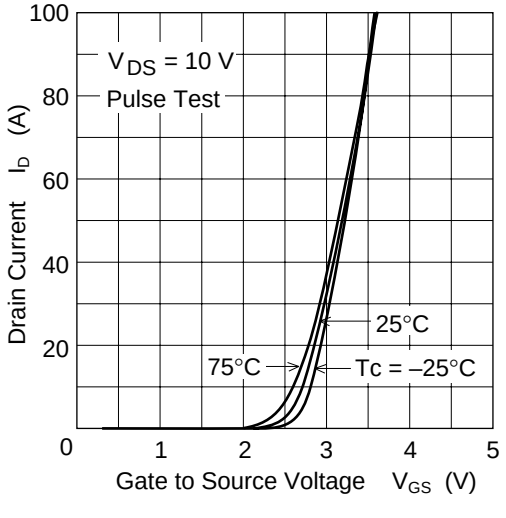
Maximum Safe Operation Area



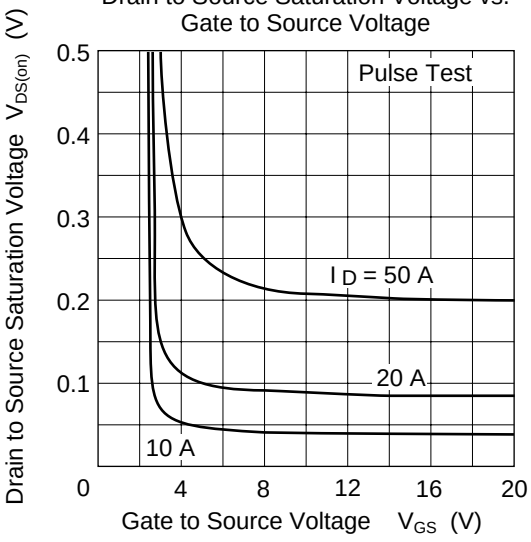
Typical Output Characteristics



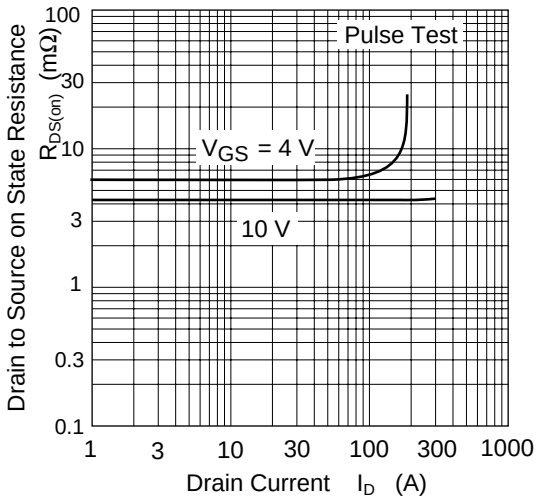
Typical Transfer Characteristics



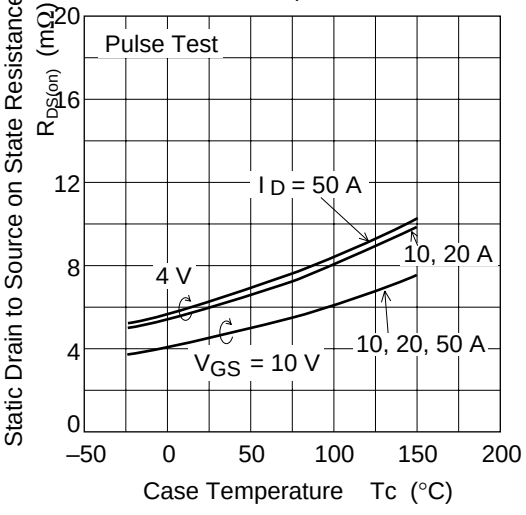
Drain to Source Saturation Voltage vs. Gate to Source Voltage



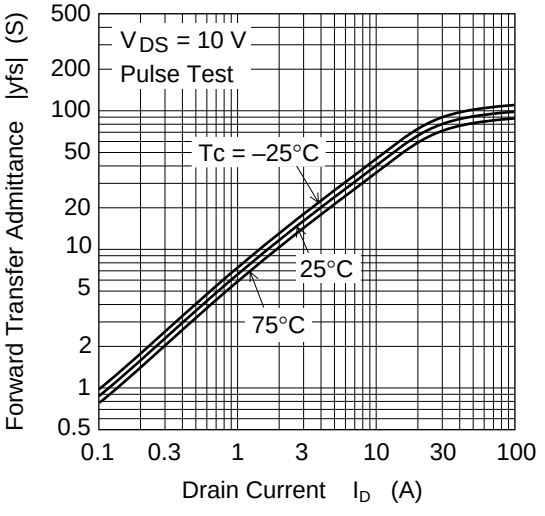
Static Drain to Source on State Resistance vs. Drain Current



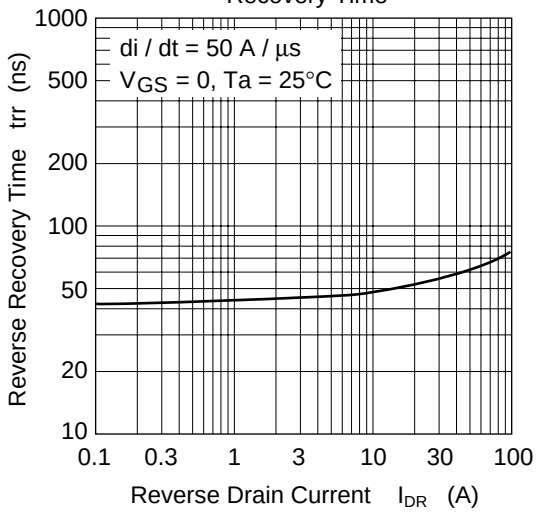
Static Drain to Source on State Resistance vs. Temperature



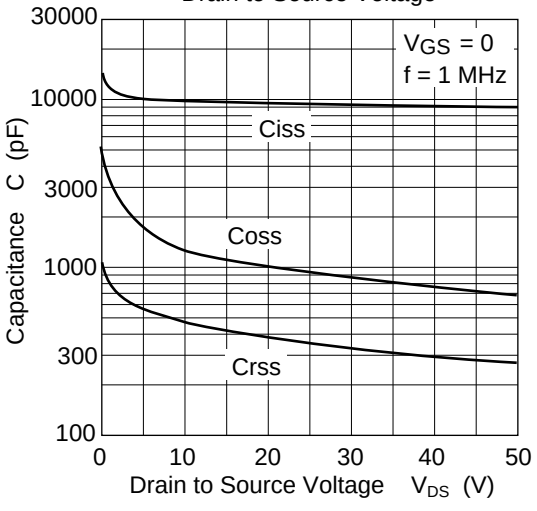
Forward Transfer Admittance vs. Drain Current



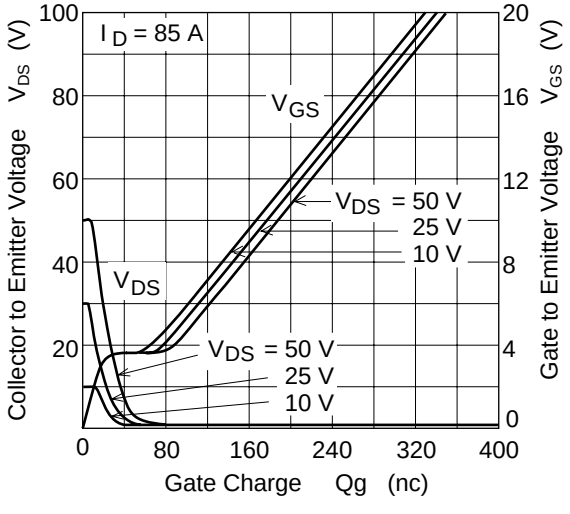
Body-Drain Diode Reverse Recovery Time



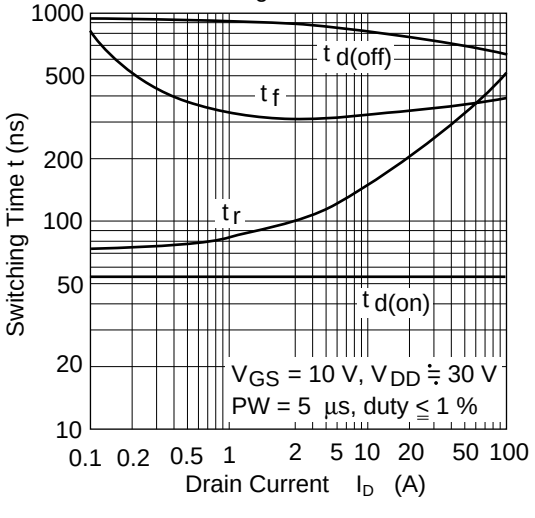
Typical Capacitance vs. Drain to Source Voltage



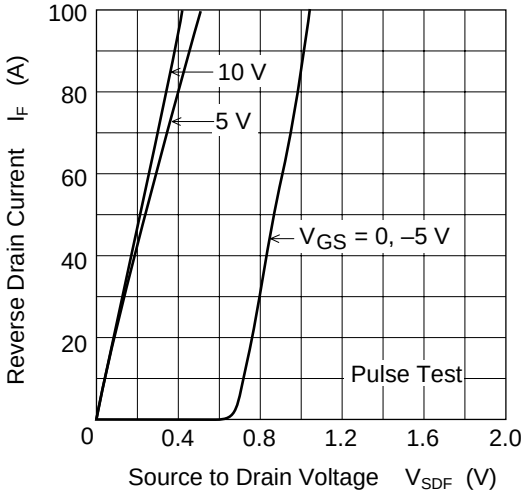
Dynamic Input Characteristics



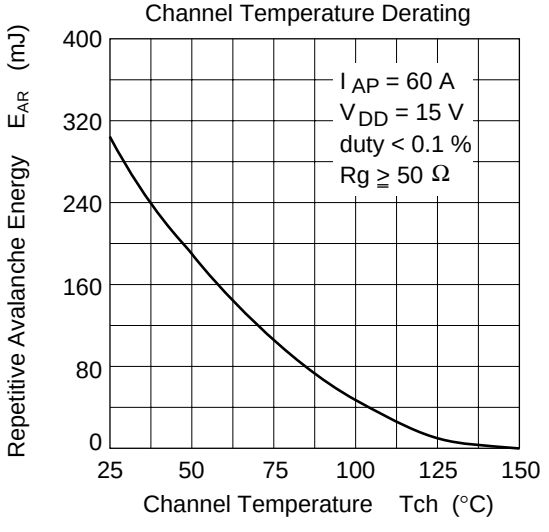
Switching Characteristics



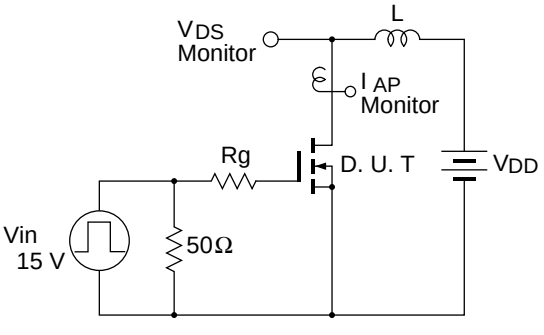
Reverse Drain Current vs. Source to Drain Voltage



Maximum Avalanche Energy vs. Channel Temperature Derating

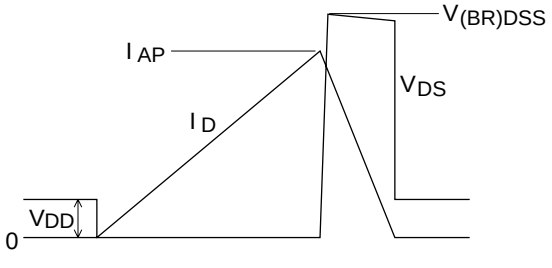


Avalanche Test Circuit

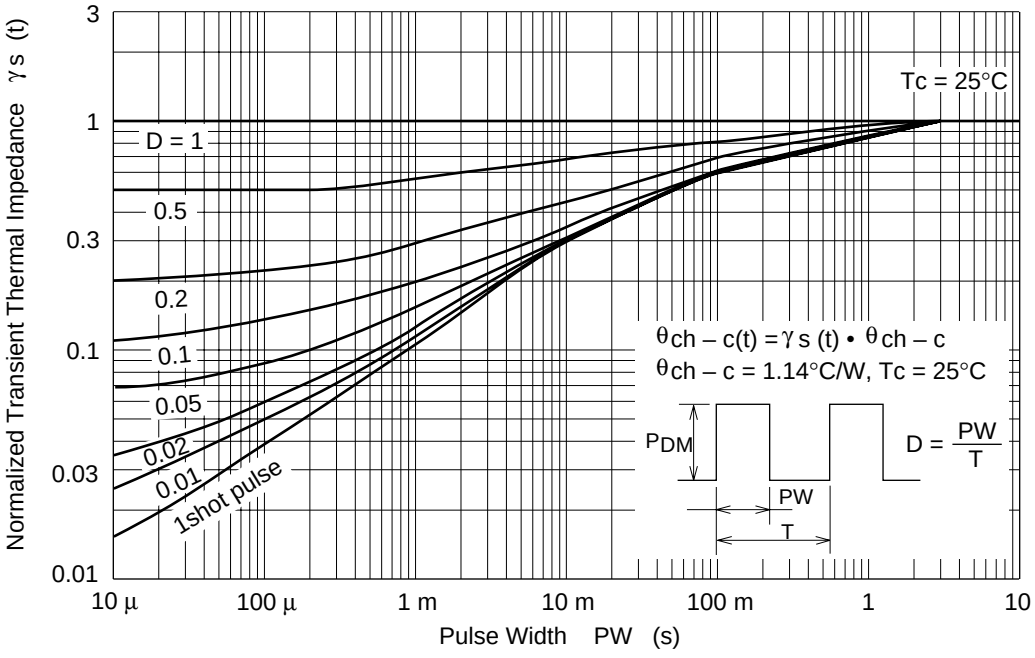


Avalanche Waveform

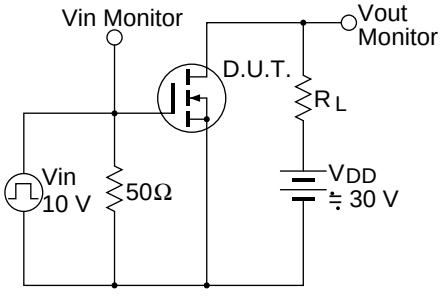
$$E_{AR} = \frac{1}{2} \bullet L \bullet I_{AP}^{2} \bullet \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$



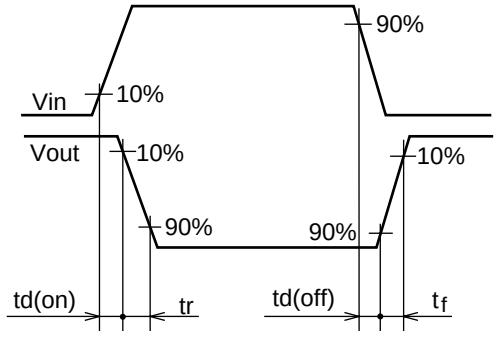
Normalized Transient Thermal Impedance vs. Pulse Width



Switching Time Test Circuit



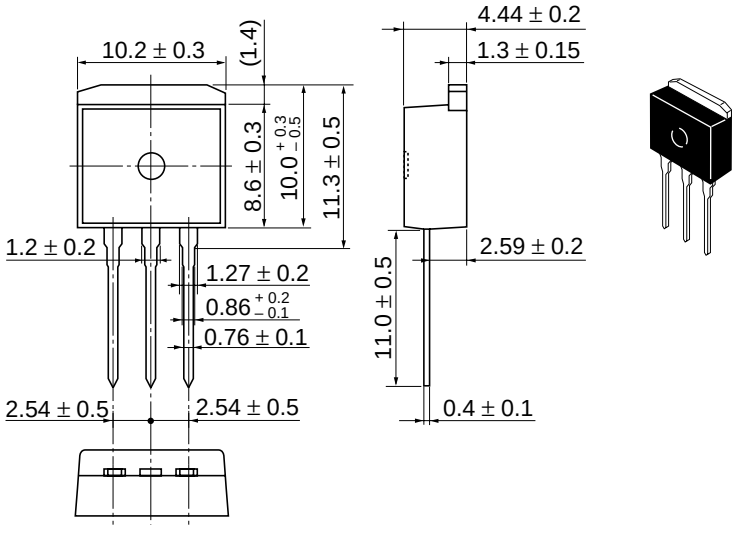
Waveform



Package Dimensions

As of January, 2001

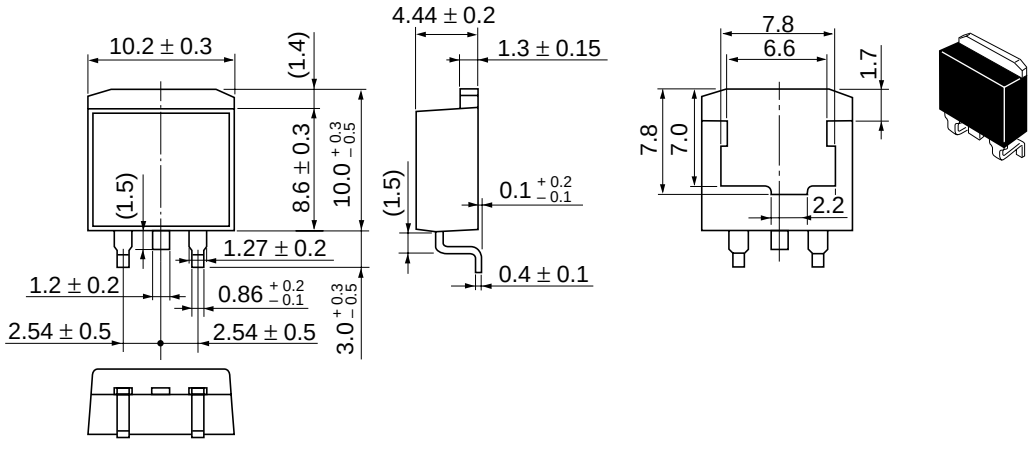
Unit: mm



Hitachi Code	LDPAK (L)
JEDEC	—
EIAJ	—
Mass (reference value)	1.4 g

As of January, 2001

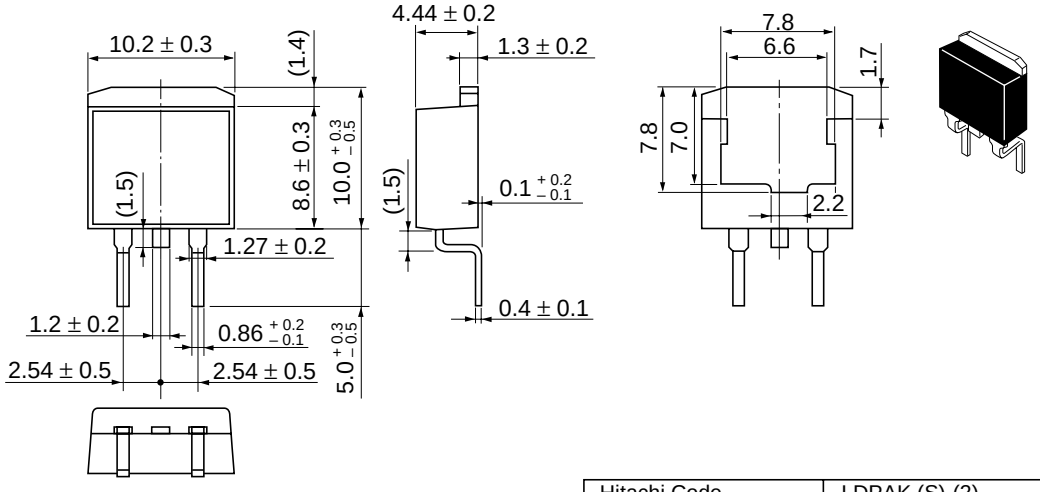
Unit: mm



Hitachi Code	LDPAK (S)-(1)
JEDEC	—
EIAJ	—
Mass (reference value)	1.3 g

As of January, 2001

Unit: mm



Hitachi Code	LDPAK (S)-(2)
JEDEC	—
EIAJ	—
Mass (reference value)	1.35 g

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