

H7N0401LD, H7N0401LS, H7N0401LM

Silicon N Channel MOS FET
High Speed Power Switching

HITACHI

ADE-208-1527C (Z)

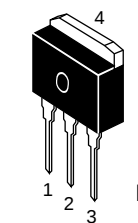
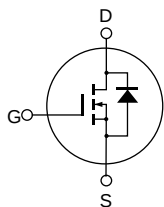
4th. Edition
May 2002

Features

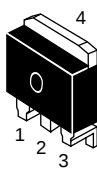
- Low on-resistance
 $R_{DS(on)} = 3.1 \text{ m}\Omega$ typ.
- 4.5 V gate drive devices
- High Speed Switching

Outline

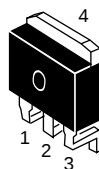
LDBPAK



H7N0401LD



H7N0401LS



H7N0401LM

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

Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DSS}	40	V
Gate to source voltage	V_{GSS}	±20	V
Drain current	I_D	95	A
Drain peak current	I_D (pulse) ^{Note1}	380	A
Body-drain diode reverse drain current	I_{DR}	95	A
Avalanche current	I_{AP} ^{Note3}	70	A
Avalanche energy	E_{AR} ^{Note3}	650	mJ
Channel dissipation	Pch ^{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 Tc = 25°C
3. Value at Tch = 25°C, Rg $\geq 50 \Omega$

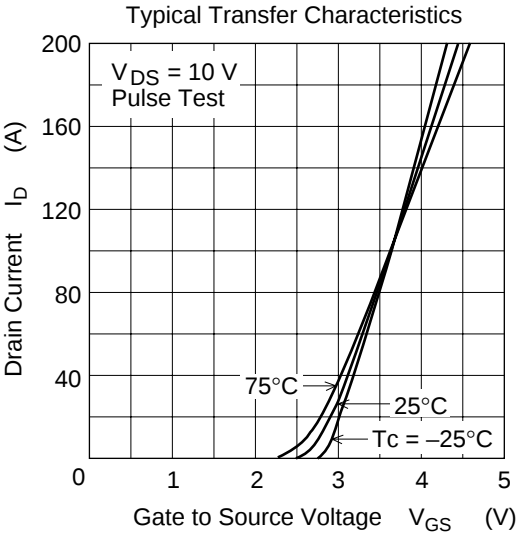
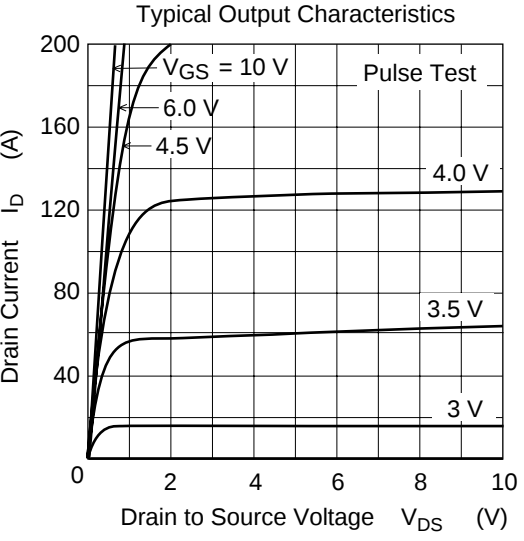
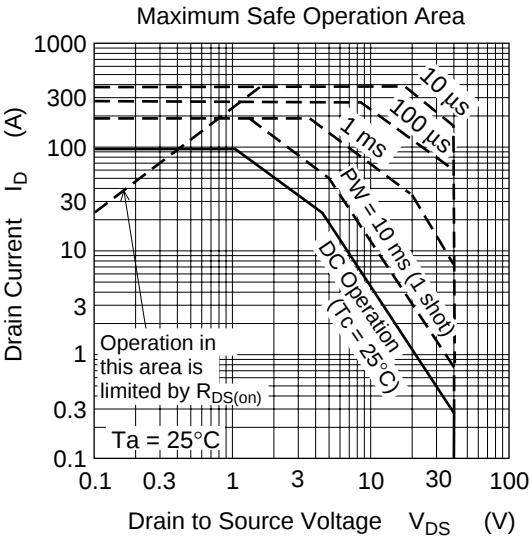
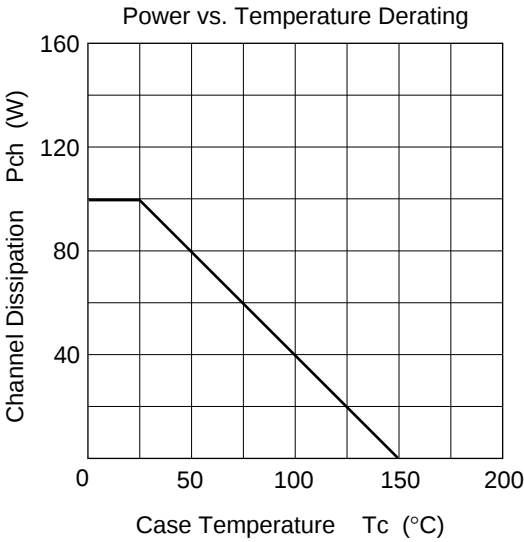
Electrical Characteristics

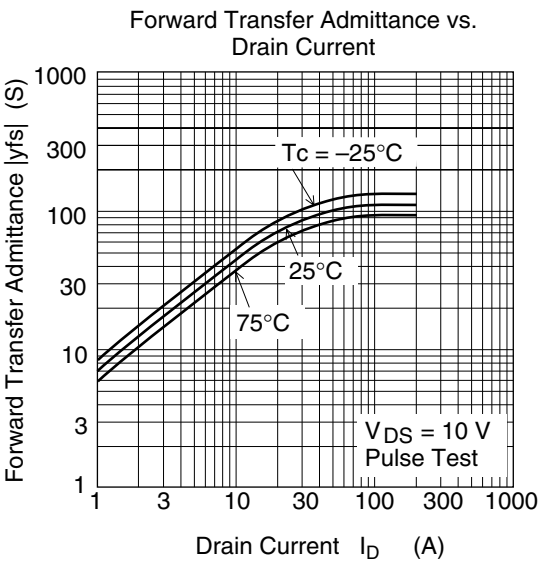
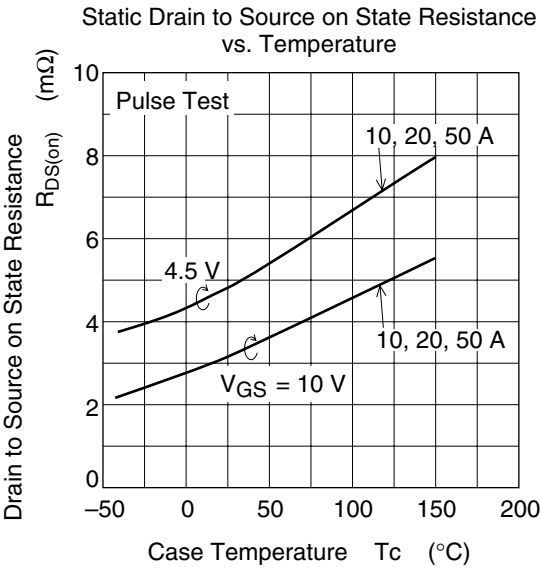
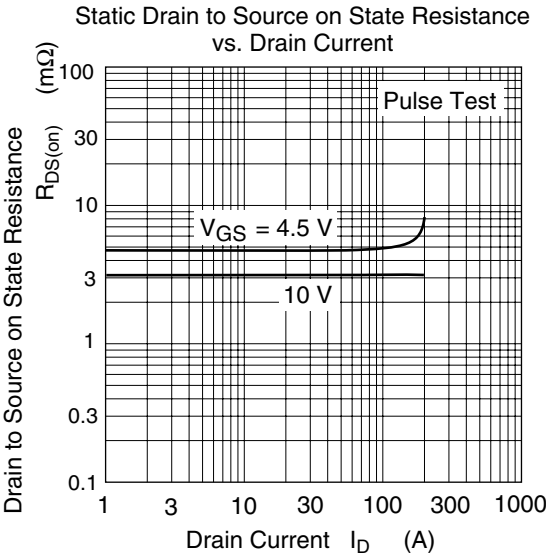
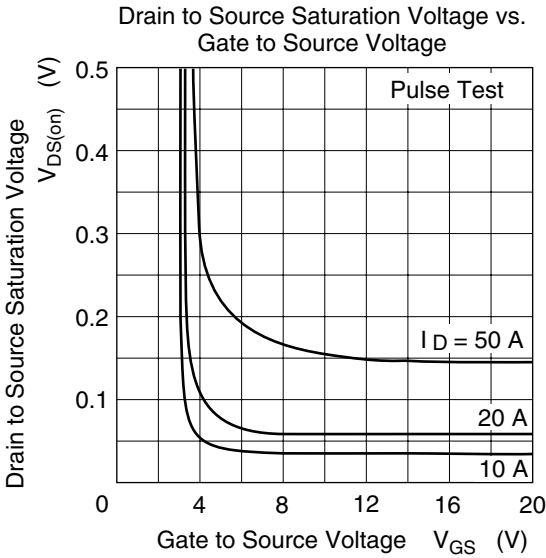
(Ta = 25°C)

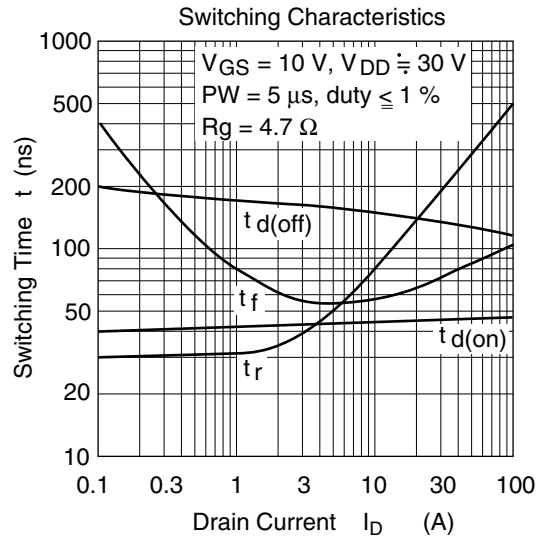
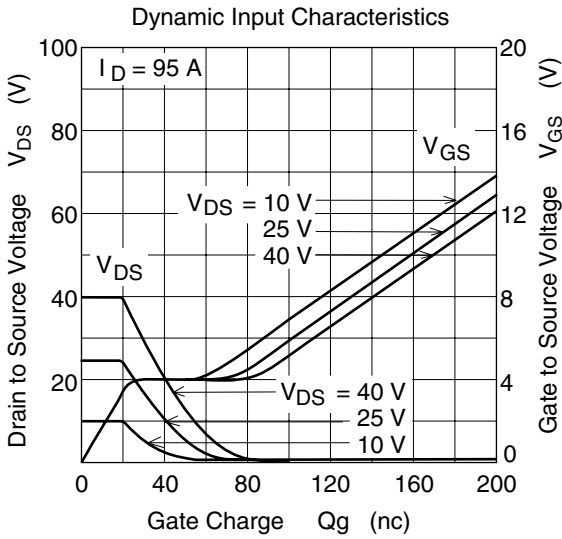
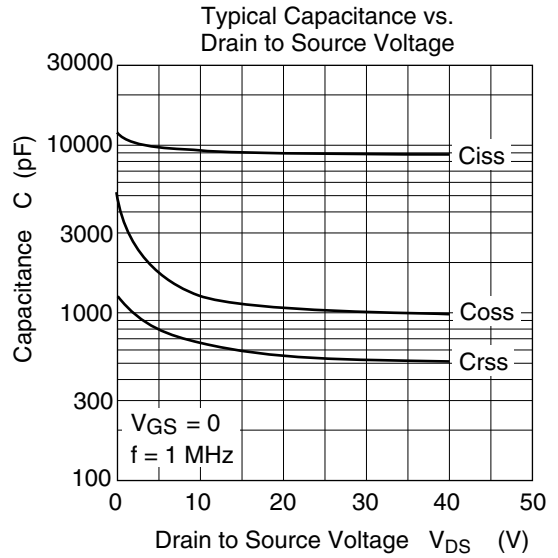
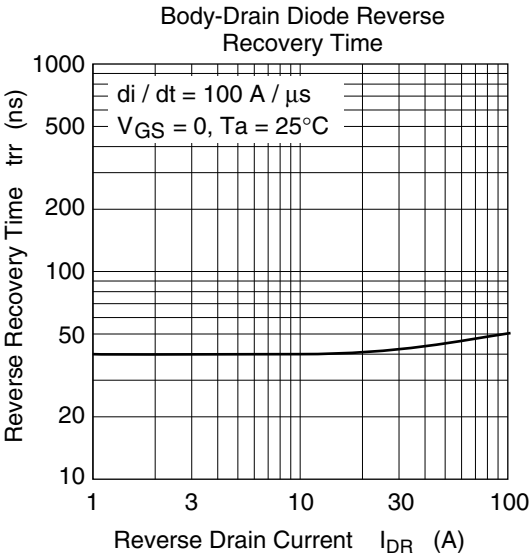
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	40	—	—	V	$I_D = 10 \text{ mA}$, $V_{GS} = 0$
Zero gate voltage drain current	I_{DSS}	—	—	10	μA	$V_{DS} = 40 \text{ V}$, $V_{GS} = 0$
Gate to source leak current	I_{GSS}	—	—	± 0.1	μA	$V_{GS} = \pm 20 \text{ V}$, $V_{DS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	1.5	—	2.5	V	$V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$ ^{Note1}
Forward transfer admittance	$ y_{fs} $	60	100	—	S	$I_D = 47.5 \text{ A}$, $V_{DS} = 10 \text{ V}$ ^{Note1}
Static drain to source on state resistance	$R_{DS(on)}$	—	3.1	4.2	$\text{m}\Omega$	$I_D = 47.5 \text{ A}$, $V_{GS} = 10 \text{ V}$ ^{Note1}
Static drain to source on state resistance	$R_{DS(on)}$	—	4.8	7.0	$\text{m}\Omega$	$I_D = 47.5 \text{ A}$, $V_{GS} = 4.5 \text{ V}$ ^{Note1}
Input capacitance	C_{iss}	—	9300	—	pF	$V_{DS} = 10 \text{ V}$
Output capacitance	C_{oss}	—	1300	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	C_{rss}	—	670	—	pF	$f = 1 \text{ MHz}$
Total gate charge	Q_g	—	160	—	nc	$V_{DD} = 25 \text{ V}$
Gate to source charge	Q_{gs}	—	36	—	nc	$V_{GS} = 10 \text{ V}$
Gate to drain charge	Q_{gd}	—	40	—	nc	$I_D = 95 \text{ A}$
Turn-on delay time	$t_{d(on)}$	—	45	—	ns	$V_{GS} = 10 \text{ V}$
Rise time	t_r	—	270	—	ns	$I_D = 47.5 \text{ A}$
Turn-off delay time	$t_{d(off)}$	—	130	—	ns	$R_L = 0.63 \Omega$
Fall time	t_f	—	85	—	ns	$R_G = 4.7 \Omega$
Body-drain diode forward voltage	V_{DF}	—	0.95	—	V	$I_F = 95 \text{ A}$, $V_{GS} = 0$
Body-drain diode reverse recovery time	t_{rr}	—	50	—	ns	$I_F = 95 \text{ A}$, $V_{GS} = 0$ $diF/dt = 100 \text{ A}/\mu\text{s}$

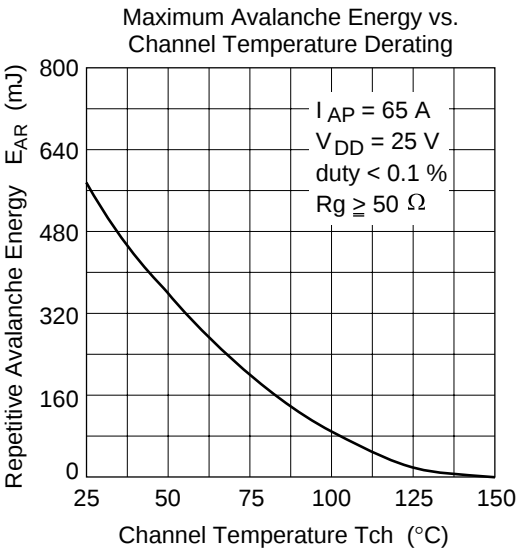
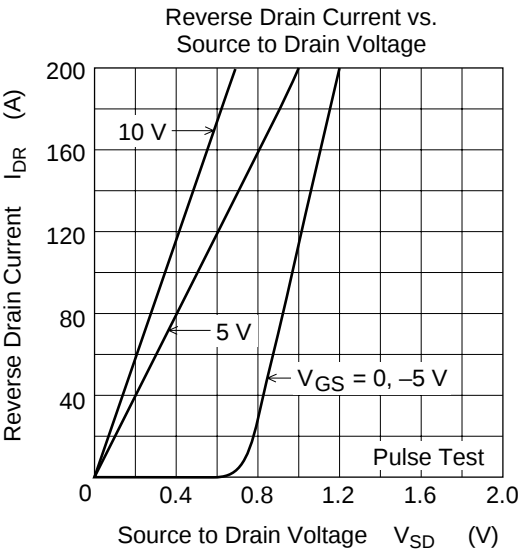
Notes: 1. Pulse test

Main Characteristics

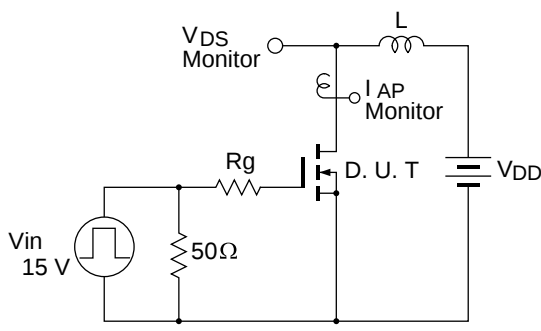






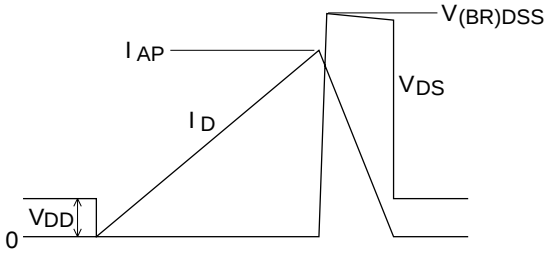


Avalanche Test Circuit

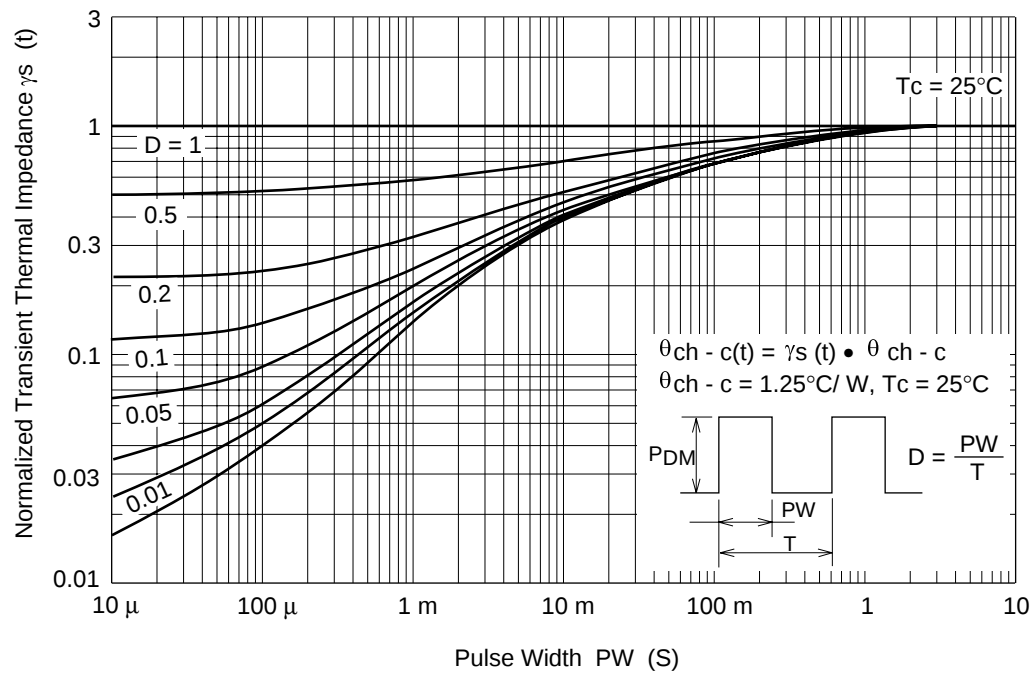


Avalanche Waveform

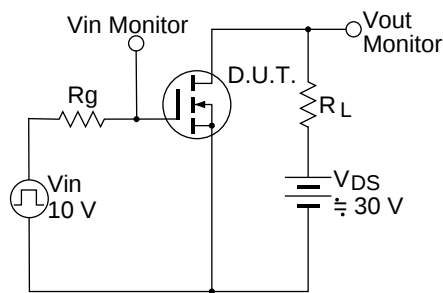
$$E_{AR} = \frac{1}{2} \cdot L \cdot I_{AP}^2 \cdot \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$



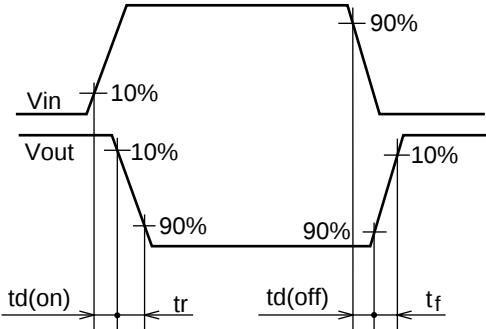
Normalized Transient Thermal Impedance vs. Pulse Width



Switching Time Test Circuit

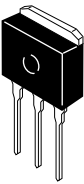
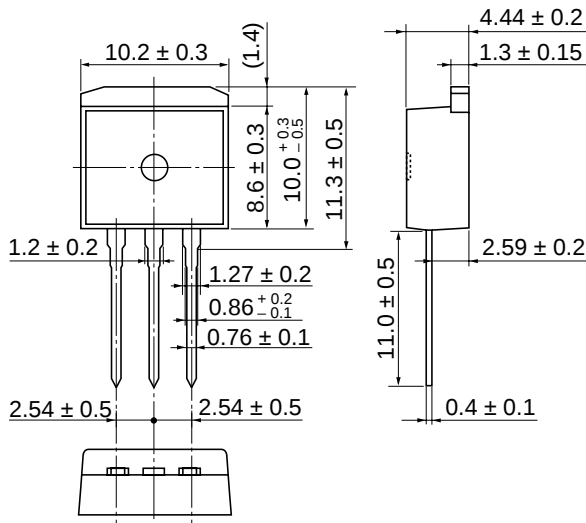


Waveform



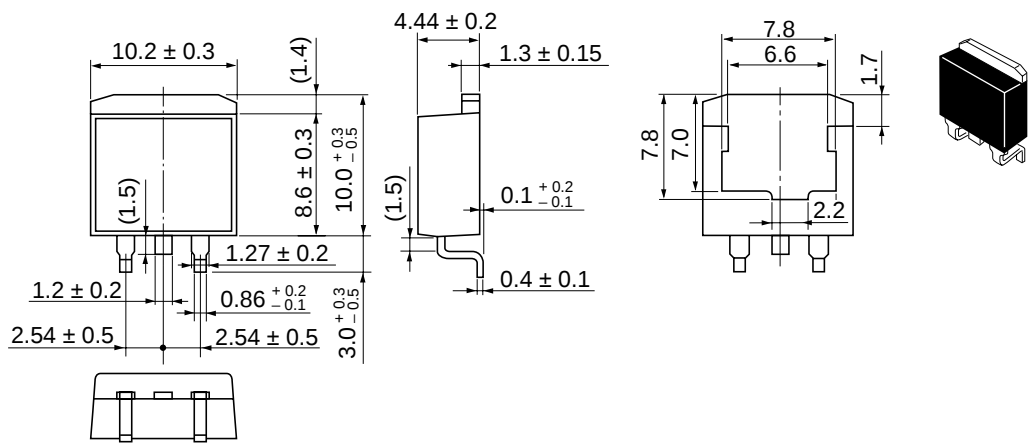
Package Dimensions

As of January, 2002
Unit: mm



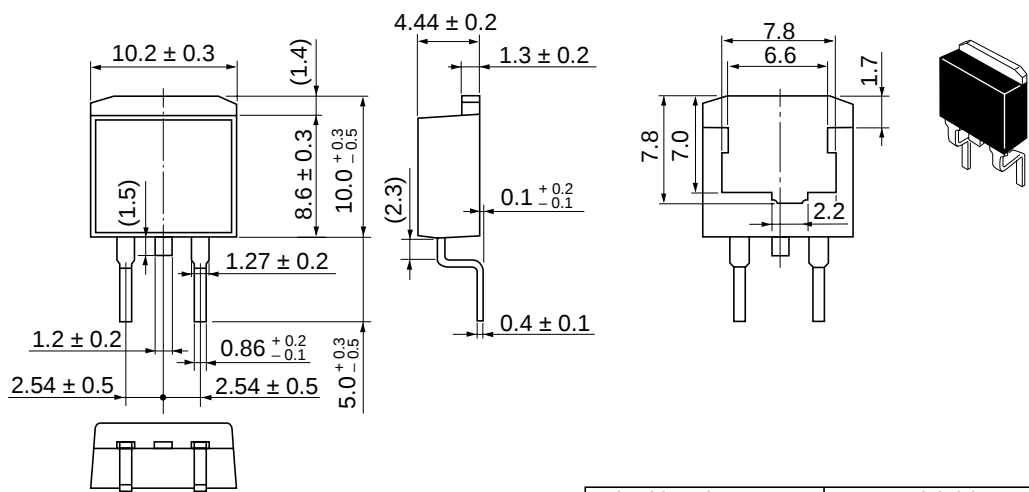
Hitachi Code	LDPAK (L)
JEDEC	—
JEITA	—
Mass (reference value)	1.4 g

As of January, 2002
Unit: mm



Hitachi Code	LDBAK (S)-(1)
JEDEC	—
JEITA	—
Mass (reference value)	1.3 g

As of January, 2002
Unit: mm



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

Disclaimer

1. Hitachi neither warrants nor grants licenses of any rights of Hitachi's or any third party's patent, copyright, trademark, or other intellectual property rights for information contained in this document. Hitachi bears no responsibility for problems that may arise with third party's rights, including intellectual property rights, in connection with use of the information contained in this document.
2. Products and product specifications may be subject to change without notice. Confirm that you have received the latest product standards or specifications before final design, purchase or use.
3. Hitachi makes every attempt to ensure that its products are of high quality and reliability. However, contact Hitachi's sales office before using the product in an application that demands especially high quality and reliability or where its failure or malfunction may directly threaten human life or cause risk of bodily injury, such as aerospace, aeronautics, nuclear power, combustion control, transportation, traffic, safety equipment or medical equipment for life support.
4. Design your application so that the product is used within the ranges guaranteed by Hitachi particularly for maximum rating, operating supply voltage range, heat radiation characteristics, installation conditions and other characteristics. Hitachi bears no responsibility for failure or damage when used beyond the guaranteed ranges. Even within the guaranteed ranges, consider normally foreseeable failure rates or failure modes in semiconductor devices and employ systemic measures such as fail-safes, so that the equipment incorporating Hitachi product does not cause bodily injury, fire or other consequential damage due to operation of the Hitachi product.
5. This product is not designed to be radiation resistant.
6. No one is permitted to reproduce or duplicate, in any form, the whole or part of this document without written approval from Hitachi.
7. Contact Hitachi's sales office for any questions regarding this document or Hitachi semiconductor products.

Sales Offices

HITACHI

Hitachi, Ltd.

Semiconductor & Integrated Circuits
 Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan
 Tel: (03) 3270-2111 Fax: (03) 3270-5109

URL <http://www.hitachisemiconductor.com/>

For further information write to:

Hitachi Semiconductor (America) Inc.
 179 East Tasman Drive
 San Jose, CA 95134
 Tel: <1> (408) 433-1990
 Fax: <1> (408) 433-0223

Hitachi Europe Ltd.
 Electronic Components Group
 Whitebrook Park
 Lower Cookham Road
 Maidenhead
 Berkshire, SL6 8YA, United Kingdom
 Tel: <44> (1628) 585000
 Fax: <44> (1628) 585200

Hitachi Europe GmbH
 Electronic Components Group
 Dornacher Straße 3
 D-85622 Feldkirchen
 Postfach 201, D-85619 Feldkirchen
 Germany
 Tel: <49> (89) 9 9180-0
 Fax: <49> (89) 9 29 30 00

Hitachi Asia Ltd.
 Hitachi Tower
 16 Collyer Quay #20-00
 Singapore 049318
 Tel: <65>-6538-6533/6538-8577
 Fax: <65>-6538-6933/6538-3877
 URL: <http://semiconductor.hitachi.com.sg>

Hitachi Asia Ltd.
 (Taipei Branch Office)
 4/F, No. 167, Tun Hwa North Road
 Hung-Kuo Building
 Taipei (105), Taiwan
 Tel: <886>-(2)-2718-3666
 Fax: <886>-(2)-2718-8180
 Telex: 23222 HAS-TP
 URL: <http://www.hitachi.com.tw>

Hitachi Asia (Hong Kong) Ltd.
 Group III (Electronic Components)
 7/F., North Tower
 World Finance Centre,
 Harbour City, Canton Road
 Tsim Sha Tsui, Kowloon Hong Kong
 Tel: <852>-2735-9218
 Fax: <852>-2730-0281
 URL: <http://semiconductor.hitachi.com.hk>

Copyright © Hitachi, Ltd., 2002. All rights reserved. Printed in Japan.
 Colophon 6.0