H7N0307LD, H7N0307LS, H7N0307LM

Silicon N Channel MOS FET
High Speed Power Switching

HITACHI

ADE-208-1516D (Z)

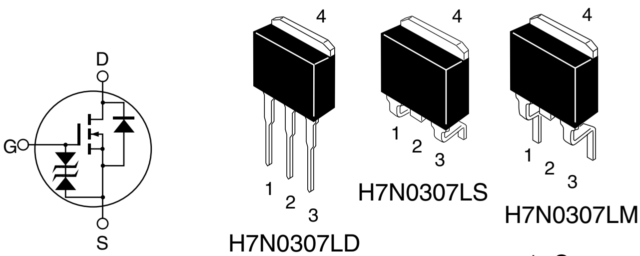
5th. Edition
May 2002

Features

- Low on-resistance
  $R_{DS(on)}$ =4.6 mΩ typ.
- Low drive current
- 4.5 V gate drive device can be driven from 5 V source

Outline

LDPAK



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

Hitachi semiconductor

Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DSS}	30	V
Gate to source voltage	V_{GSS}	±20	V
Drain current	I_D	60	A
Drain peak current	$I_{D(pulse)}$ Note 1	240	A
Body-drain diode reverse drain current	I_{DR}	60	A
Channel dissipation	Pch Note 2	90	W
Channel to Case Thermal Impedance	θch-c	1.39	°C/W
Channel to Ambient Thermal Impedance	θch-a	89	°C/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

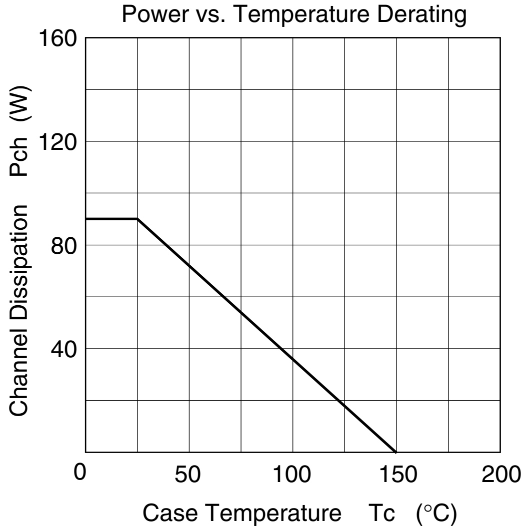
Electrical Characteristics

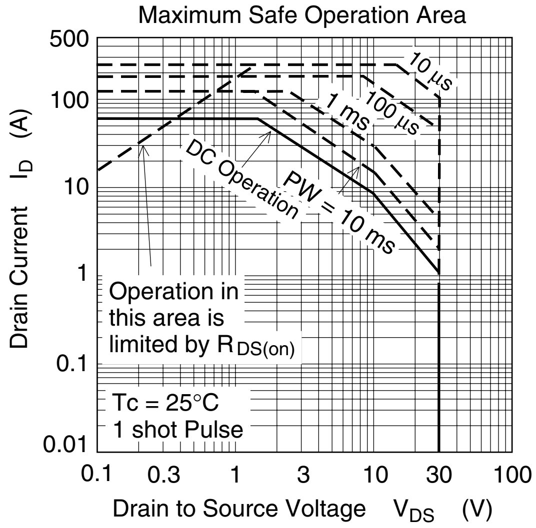
(Ta = 25°C)

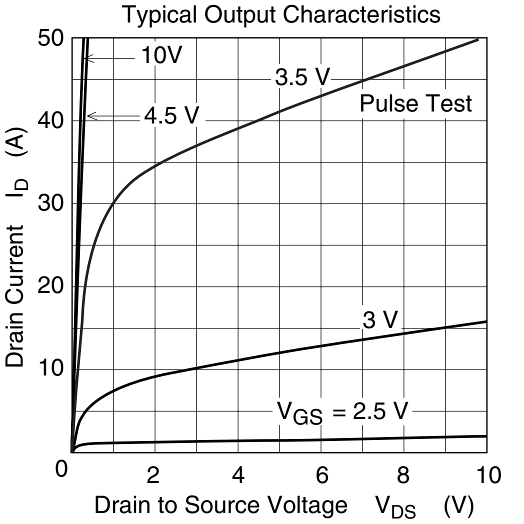
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	30	—	—	V	I_D = 10 mA, V_{GS} = 0
Gate to source breakdown voltage	$V_{(BR)GSS}$	±20	—	—		I_G = ±100 µA, V_{DS} = 0
Gate to source leak current	I_{GSS}	—	—	±10	µA	V_{GS} = ±16 V, V_{DS} = 0
Zero gate voltege drain current	I_{DSS}	—	—	10	µA	V_{DS} = 30 V, V_{GS} = 0
Gate to source cutoff voltage	$V_{GS(off)}$	1.0	—	2.5	V	I_D = 1 mA, V_{DS} = 10 V*[1]
Static drain to source on state resistance	$R_{DS(on)}$	—	4.6	5.8	mΩ	I_D = 30 A, V_{GS} = 10 V*[1]
		—	8.0	11.5	mΩ	I_D = 30 A, V_{GS} = 4.5 V*[1]
Forward transfer admittance	$\|y_{fs}\|$	40	65	—	S	I_D = 30 A, V_{DS} = 10 V*[1]
Input capacitance	Ciss	—	2500	—	pF	V_{DS} = 10 V
Output capacitance	Coss	—	650	—	pF	V_{GS} = 0
Reverse transfer capacitance	Crss	—	350	—	pF	f = 1 MHz
Total gate charge	Qg	—	40	—	nc	V_{DD} = 10 V
Gate to source charge	Qgs	—	7	—	nc	V_{GS} = 10 V
Gate to drain charge	Qgd	—	8	—	nc	I_D = 60 A
Turn-on delay time	$t_{d(on)}$	—	20	—	ns	V_{GS} = 10 V, I_D = 30 A
Rise time	t_r	—	300	—	ns	R_L =0.33 Ω
Turn-off delay time	$t_{d(off)}$	—	70	—	ns	R_g =4.7 Ω
Fall time	t_f	—	20	—	ns	
Body–drain diode forward voltage	V_{DF}	—	0.92	—	V	I_F = 60 A, V_{GS} = 0
Body–drain diode reverse recovery time	t_{rr}	—	60	—	ns	I_F = 60 A, V_{GS} = 0 diF/ dt =50 A/µs

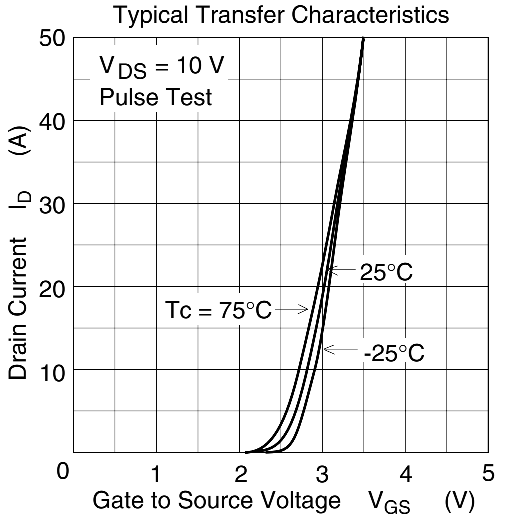
Note: 1. Pulse test

Main Characteristics

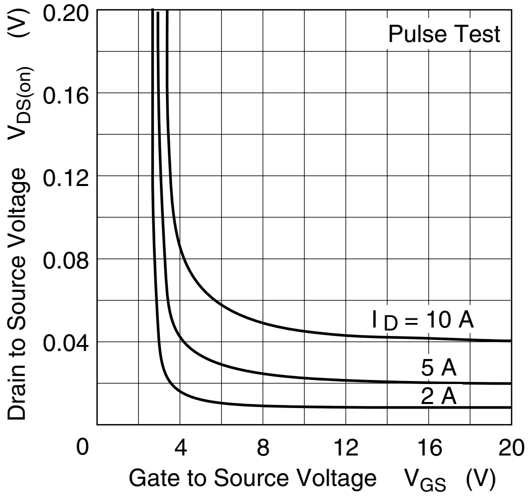




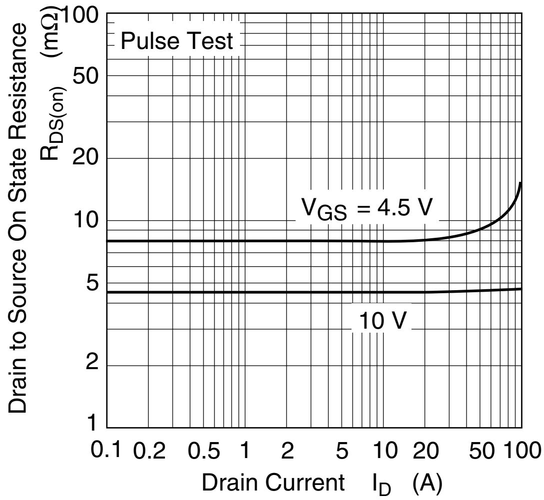




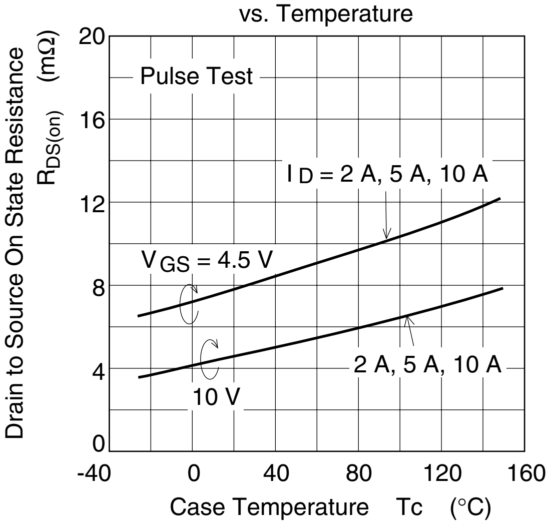
Drain to Source Saturation Voltage vs. Gate to Source Voltage



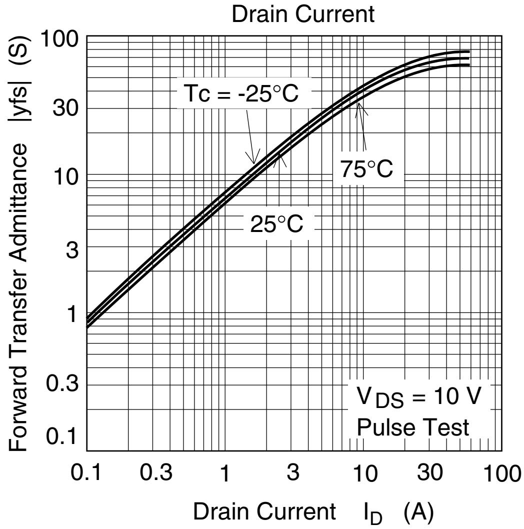
Static Drain to Source on State Resistance vs. Drain Current

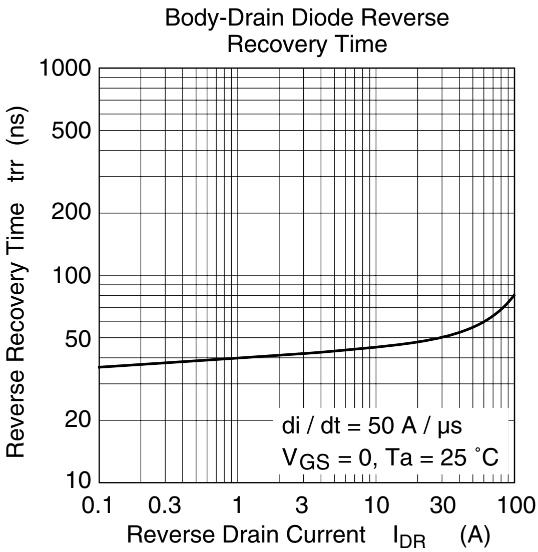


Static Drain to Source on State Resistance vs. Temperature

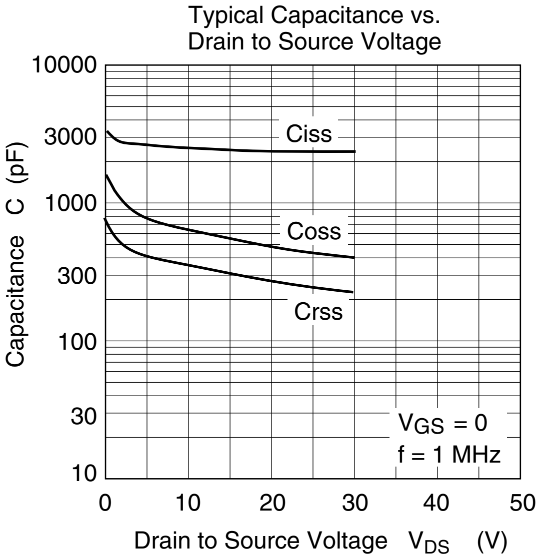


Forward Transfer Admittance vs. Drain Current

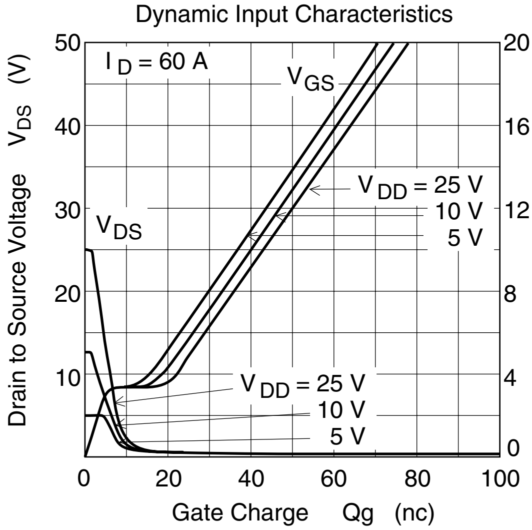




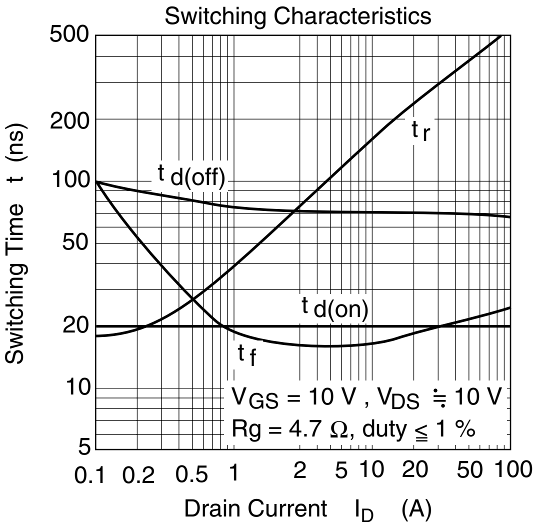
Body-Drain Diode Reverse Recovery Time
Reverse Recovery Time trr (ns)
1000
500
200
100
50
20
10
0.1
0.3
1
3
10
30
100
Reverse Drain Current I_{DR} (A)
di / dt = 50 A / µs
V_{GS} = 0, Ta = 25 °C



Typical Capacitance vs. Drain to Source Voltage
Capacitance C (pF)
10000
3000
1000
300
100
30
10
0
10
20
30
40
50
Drain to Source Voltage V_{DS} (V)
Ciss
Coss
Crss
V_{GS} = 0
f = 1 MHz

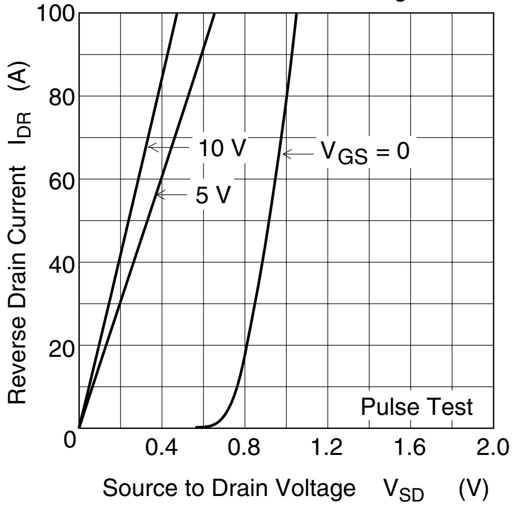


Dynamic Input Characteristics
Drain to Source Voltage V_{DS} (V)
Gate to Source Voltage V_{GS} (V)
50
40
30
20
10
20
16
12
8
4
0
0
20
40
60
80
100
Gate Charge Qg (nc)
I_D = 60 A
V_{GS}
V_{DD} = 25 V
10 V
5 V
V_{DS}
V_{DD} = 25 V
10 V
5 V

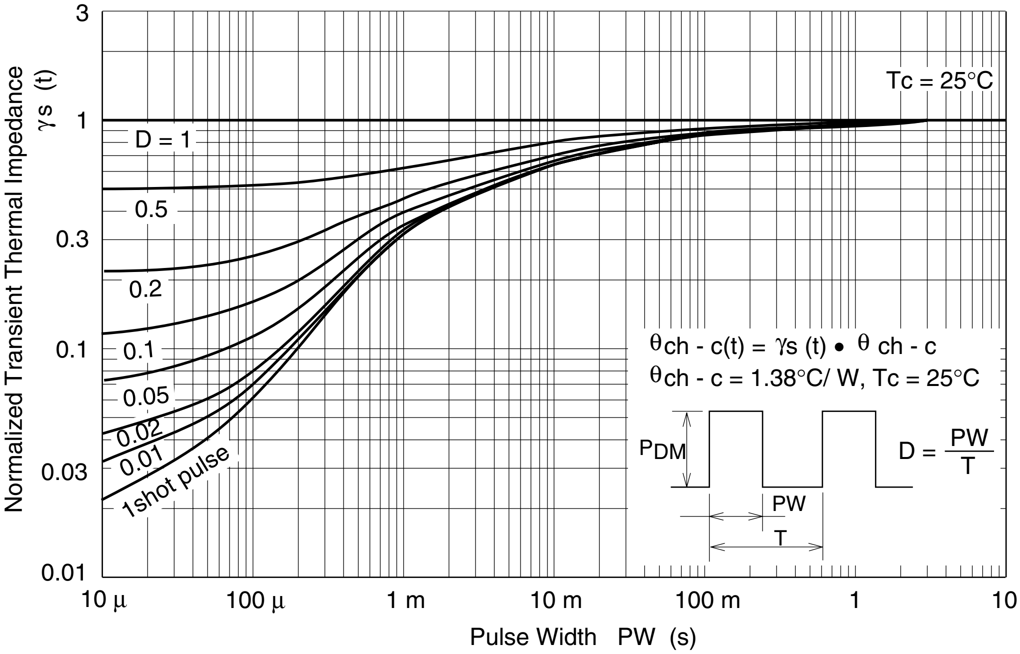


Switching Characteristics
Switching Time t (ns)
500
200
100
50
20
10
5
0.1
0.2
0.5
1
2
5
10
20
50
100
Drain Current I_D (A)
t_r
$t_{d(off)}$
$t_{d(on)}$
t_f
V_{GS} = 10 V , V_{DS} ≒ 10 V
Rg = 4.7 Ω, duty ≦ 1 %

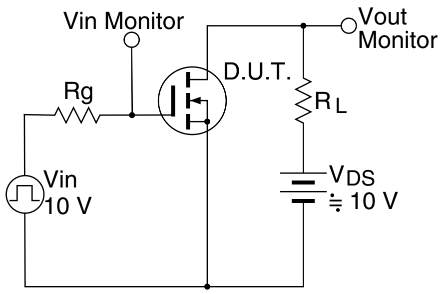
Reverse Drain Current vs. Souece to Drain Voltage



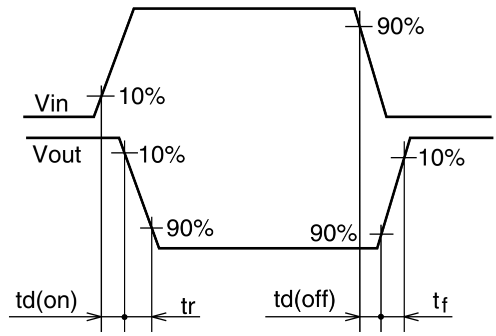
Normalized Transient Thermal Impedance vs. Pulse Width



Switching Time Test Circuit



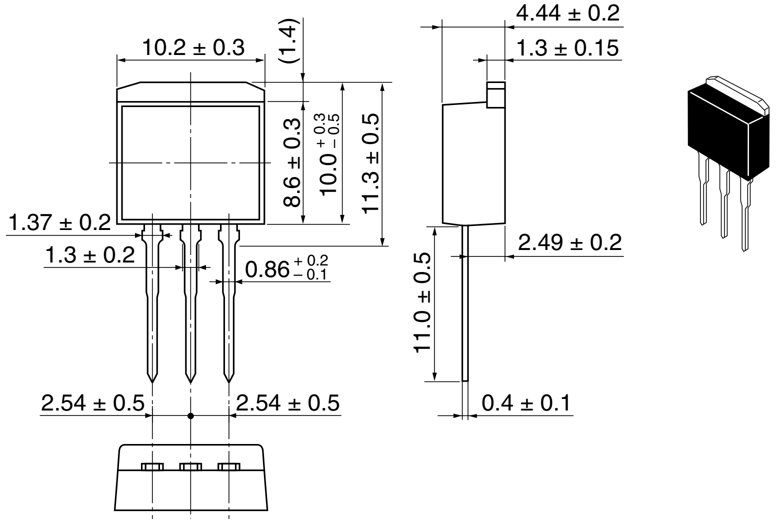
Switching Time Waveform



Package Dimensions

• H7N0307LD

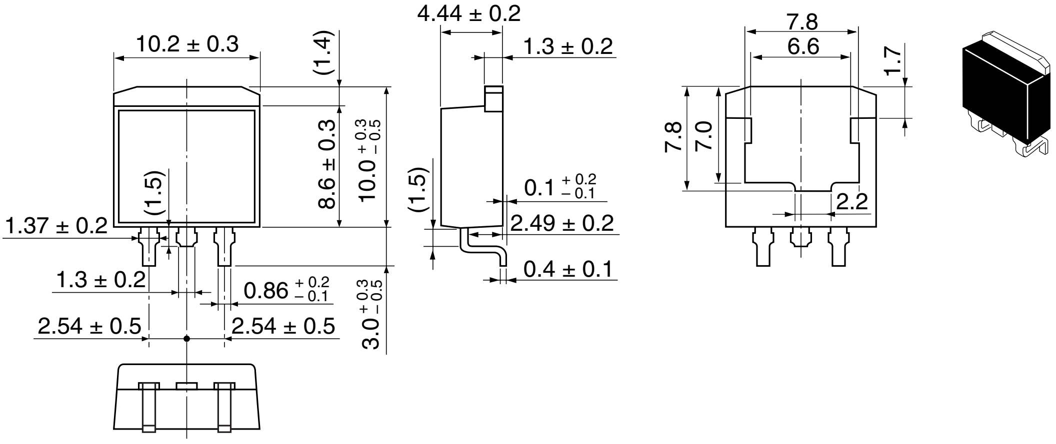
Unit: mm



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

• H7N0307LS

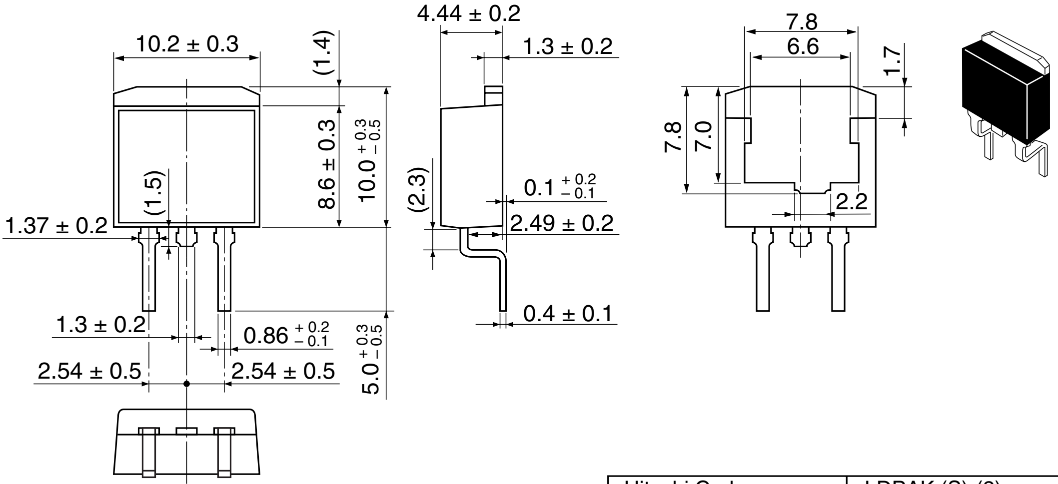
Unit: mm



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

• H7N0307LM

Unit: mm



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

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