2SJ545

Silicon P Channel MOS FET
High Speed Power Switching

HITACHI

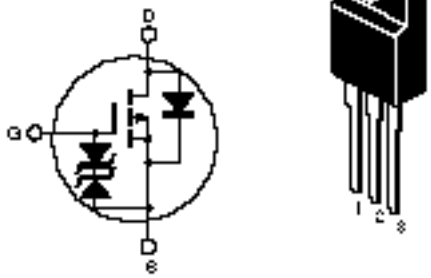
ADE-208-643A (Z)
2nd. Edition
Jun 1998

Features

- Low on-resistance
  $R_{DS(on)}$ = 0.11 Ω typ.
- Low drive current
- 4 V gete drive devices
- High speed switching

Outline

TO-220CFM



1. Gate
2. Drain
3. Source

Hitachi semiconductor

Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DSS}	–60	V
Gate to source voltage	V_{GSS}	±20	V
Drain current	I_D	–12	A
Drain peak current	$I_{D(pulse)}$ Note1	–48	A
Body-drain diode reverse drain current	I_{DR}	–12	A
Avalenche current	I_{AP} Note3	–12	A
Avalenche energy	E_{AR} Note3	12	mJ
Channel dissipation	Pch Note2	25	W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	–55 to +150	°C

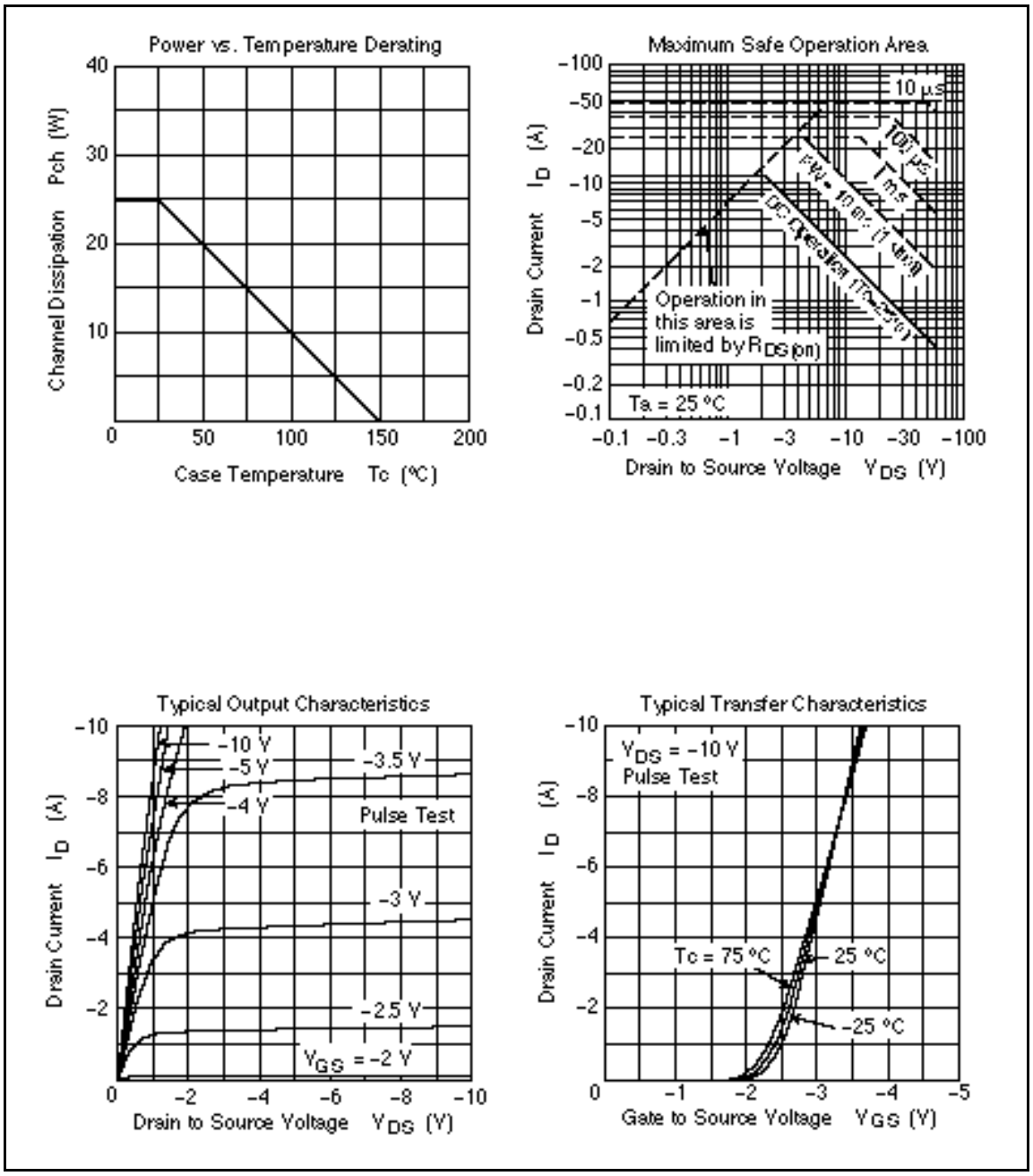
Note: 1. PW ≤ 10µs, duty cycle ≤ 1 %
2. Value at Tc = 25°C
3. Value at Tch = 25°C, Rg ≥ 50 Ω

Electrical Characteristics (Ta = 25°C)

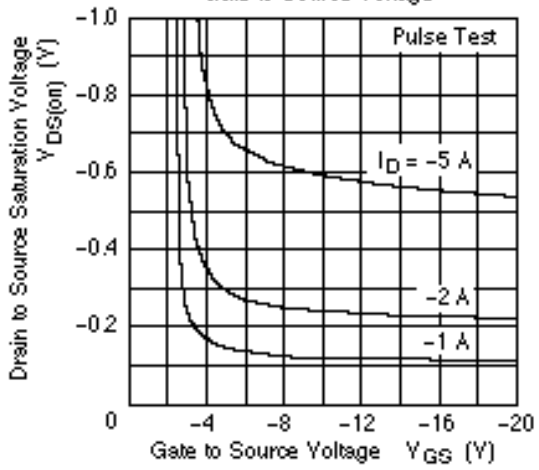
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	–60	—	—	V	I_D = –10mA, V_{GS} = 0
Gate to source breakdown voltage	$V_{(BR)GSS}$	±20	—	—	V	I_G = ±100µA, V_{DS} = 0
Zero gate voltege drain current	I_{DSS}	—	—	–10	µA	V_{DS} = –60 V, V_{GS} = 0
Gate to source leak current	I_{GSS}	—	—	±10	µA	V_{GS} = ±16V, V_{DS} = 0
Gate to source cutoff voltage	$V_{GS(off)}$	–1.0	—	–2.0	V	I_D = –1mA, V_{DS} = –10V
Static drain to source on state resistance	$R_{DS(on)}$	—	0.11	0.15	Ω	I_D = –6A, V_{GS} = –10V Note4
	$R_{DS(on)}$	—	0.16	0.23	Ω	I_D = –6A, V_{GS} = –4V Note4
Forward transfer admittance	$\|y_{fs}\|$	5	8	—	S	I_D = –6A, V_{DS} = –10V Note4
Input capacitance	Ciss	—	580	—	pF	V_{DS} = –10V
Output capacitance	Coss	—	300	—	pF	V_{GS} = 0
Reverse transfer capacitance	Crss	—	85	—	pF	f = 1MHz
Turn-on delay time	$t_{d(on)}$	—	10	—	ns	V_{GS} = –10V, I_D = –6A
Rise time	t_r	—	55	—	ns	R_L = 6Ω
Turn-off delay time	$t_{d(off)}$	—	85	—	ns	
Fall time	t_f	—	60	—	ns	
Body–drain diode forward voltage	V_{DF}	—	–1.2	—	V	I_F = –12A, V_{GS} = 0
Body–drain diode reverse recovery time	t_{rr}	—	60	—	ns	I_F = –12A, V_{GS} = 0 diF/ dt = 50A/µs

Note: 4. Pulse test

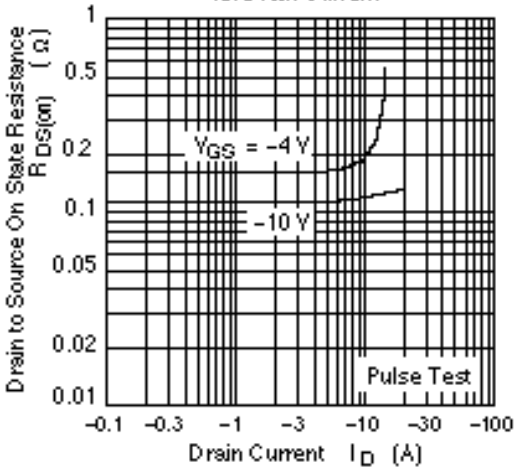
Main Characteristics



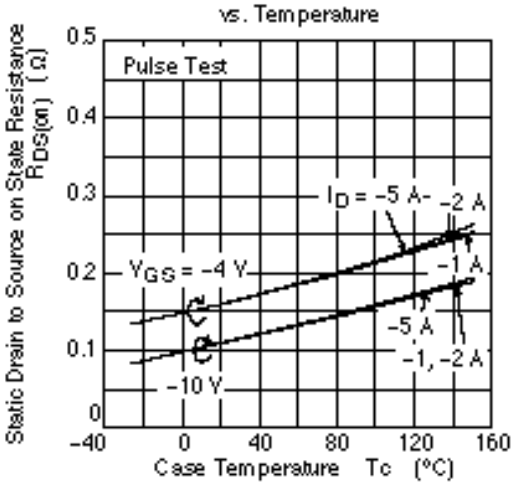
Drain to Source Saturation Voltage vs. Gate to Source Voltage



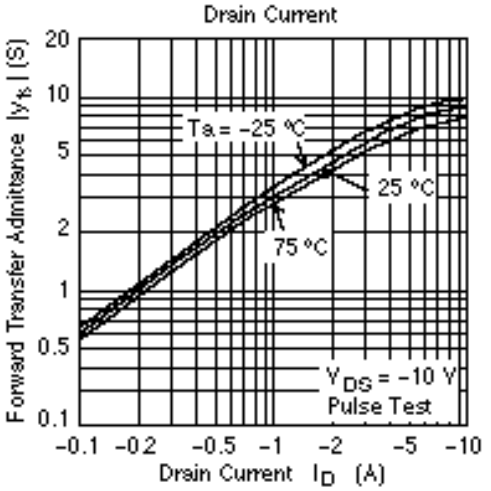
Static Drain to Source on State Resistance vs. Drain Current

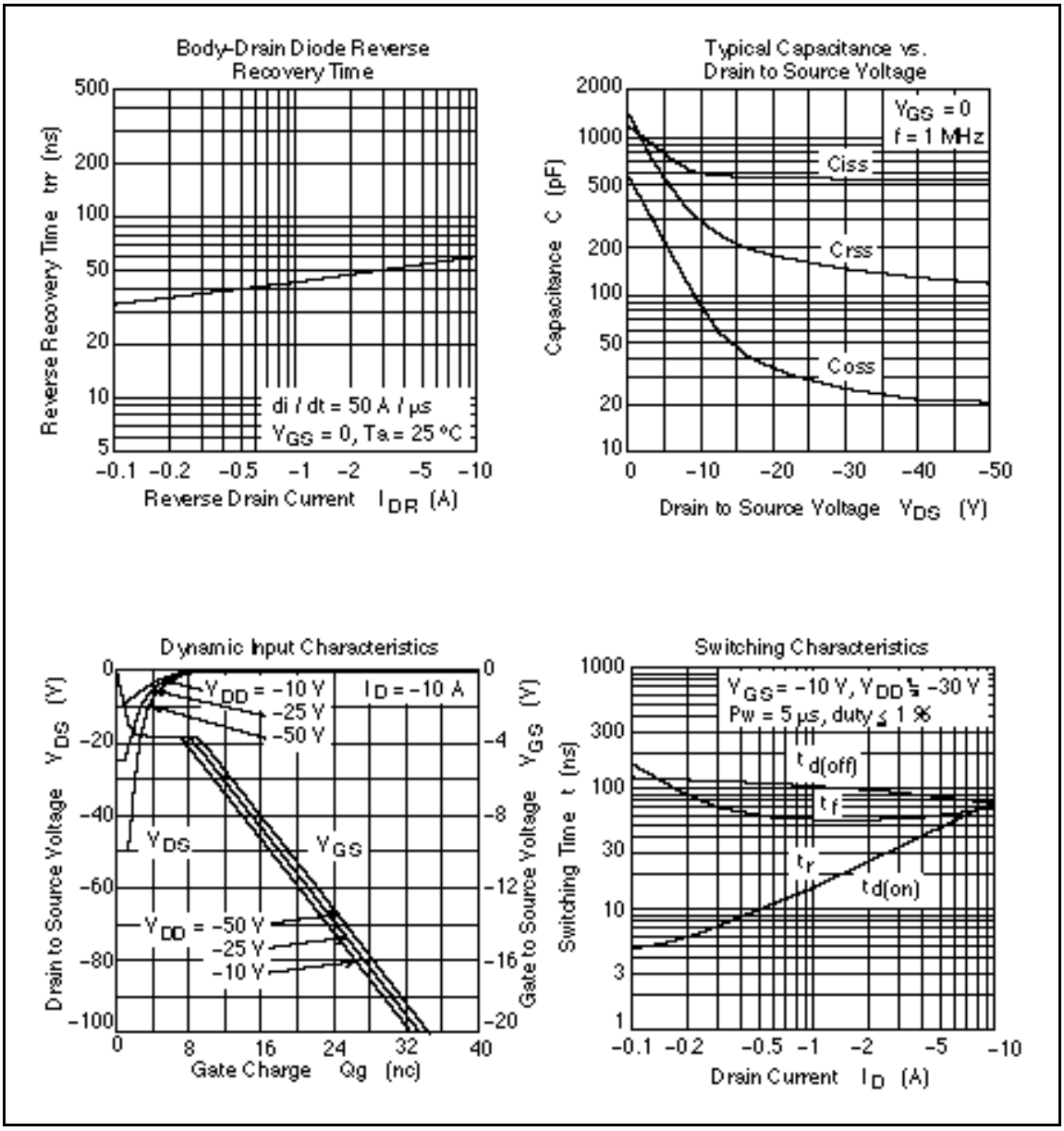


Static Drain to Source on State Resistance vs. Temperature

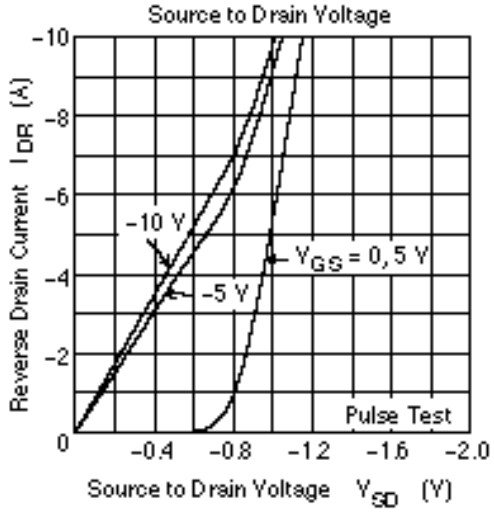


Forward Transfer Admittance vs. Drain Current

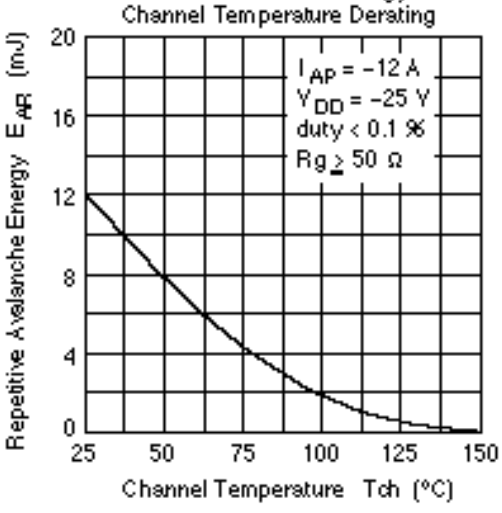



Body-Drain Diode Reverse Recovery Time
Reverse Recovery Time trr (ns)
500
200
100
50
20
10
5
di / dt = 50 A / µs
VGS = 0, Ta = 25 °C
-0.1 -0.2 -0.5 -1 -2 -5 -10
Reverse Drain Current IDR (A)
Typical Capacitance vs. Drain to Source Voltage
Capacitance C (pF)
2000
1000
500
200
100
50
20
10
VGS = 0
f = 1 MHz
Ciss
Crss
Coss
0 -10 -20 -30 -40 -50
Drain to Source Voltage VDS (Y)
Dynamic Input Characteristics
Drain to Source Voltage VDS (V)
0
-20
-40
-60
-80
-100
VDD = -10 V
-25 V
-50 V
ID = -10 A
VDS
VGS
VDD = -50 V
-25 V
-10 V
Gate to Source Voltage VGS (V)
0
-4
-8
-12
-16
-20
0 8 16 24 32 40
Gate Charge Qg (nc)
Switching Characteristics
Switching Time t (ns)
1000
300
100
30
10
3
1
VGS = -10 V, VDD ≒ -30 V
Pw = 5 µs, duty ≦ 1 %
td(off)
tf
tr
td(on)
-0.1 -0.2 -0.5 -1 -2 -5 -10
Drain Current ID (A)

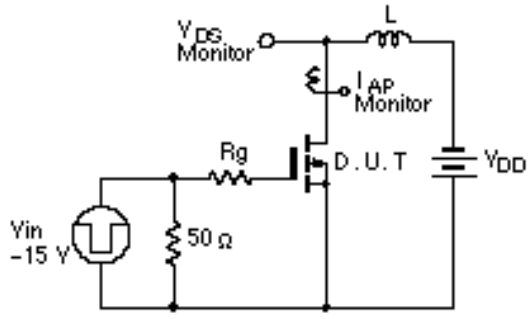
Reverse Drain Current vs.
Source to Drain Voltage



Maximum Avalanche Energy vs.
Channel Temperature Derating

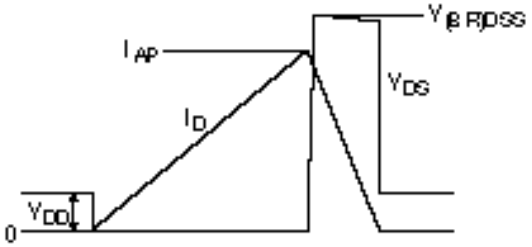


Avalanche Test Circuit

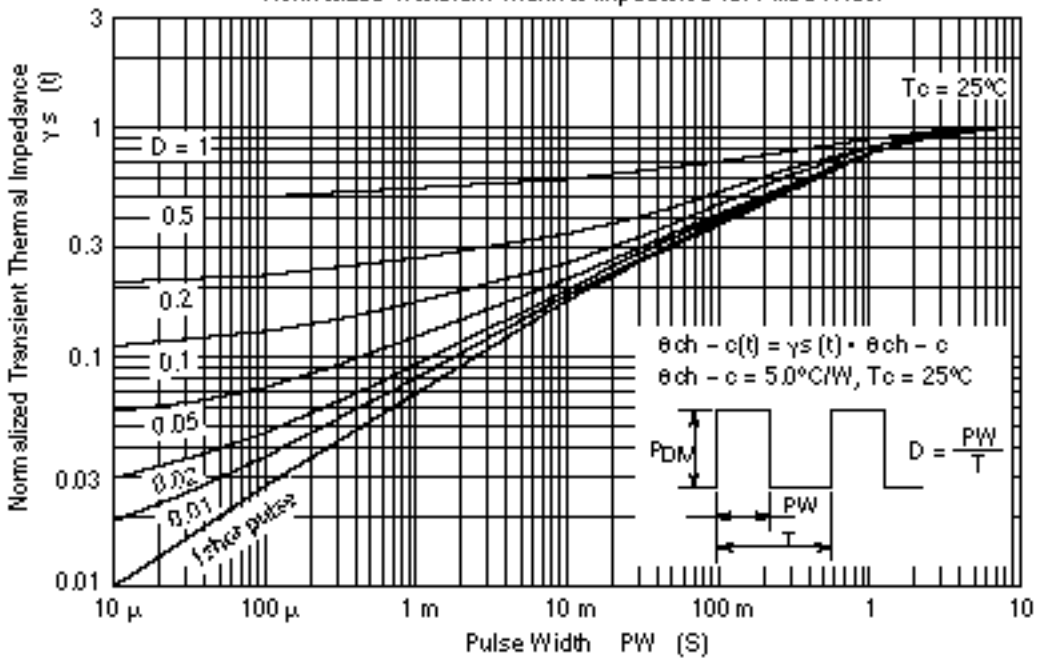


Avalanche Waveform

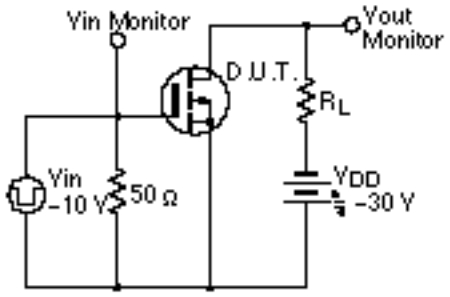
$$E_{AR} = \frac{1}{2} \cdot L \cdot I_{AP}^2 \cdot \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$



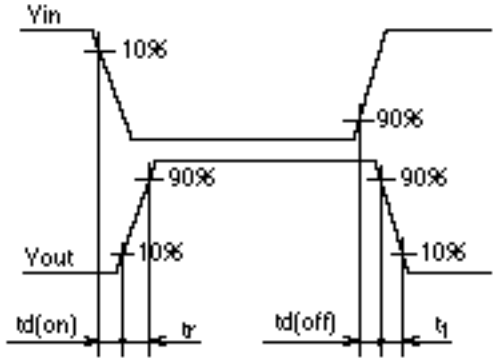
Normalized Transient Thermal Impedance vs. Pulse Width



Switching Time Test Circuit

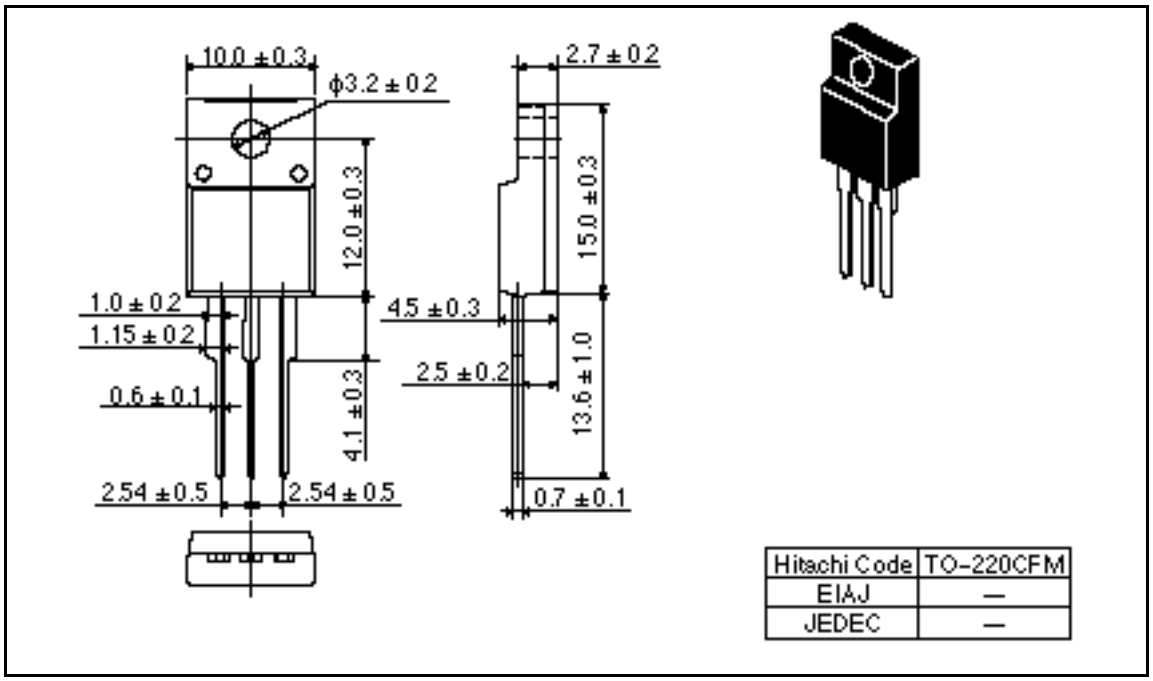


Waveform



Package Dimensions

Unit: mm



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HITACHI

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

For further information write to:

Hitachi Semiconductor (America) Inc.
2000 Sierra Point Parkway
Brisbane, CA. 94005-1897
U.S.A.
Tel: 800-285-1601
Fax: 303-297-0447

Hitachi Europe GmbH
Continental Europe
Dornacher Straße 3
D-85622 Feldkirchen
München
Tel: 089-9 91 80-0
Fax: 089-9 29 30-00

Hitachi Europe Ltd.
Electronic Components Div.
Northern Europe Headquarters
Whitebrook Park
Lower Cookham Road
Maidenhead
Berkshire SL6 8YA
United Kingdom
Tel: 01628-585000
Fax: 01628-585160

Hitachi Asia Pte. Ltd.
16 Collyer Quay #20-00
Hitachi Tower
Singapore 049318
Tel: 535-2100
Fax: 535-1533

Hitachi Asia (Hong Kong) Ltd.
Unit 706, North Tower,
World Finance Centre,
Harbour City, Canton Road
Tsim Sha Tsui, Kowloon
Hong Kong
Tel: 27359218
Fax: 27306071