HAT2019R

Silicon N Channel Power MOS FET
High Speed Power Switching

HITACHI

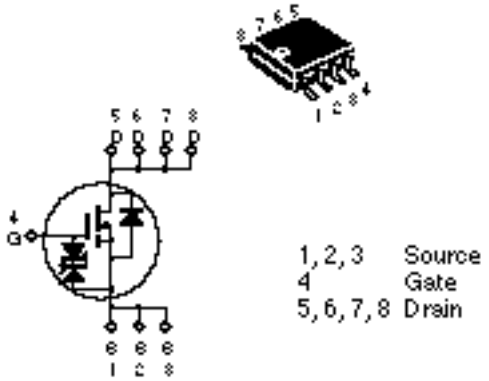
ADE-208-481 C
4th. Edition

Features

- Low on-resistance
- Capable of 2.5 V gate drive
- Low drive current
- High density mounting

Outline

SOP-8



Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DSS}	30	V
Gate to source voltage	V_{GSS}	±12	V
Drain current	I_D	8	A
Drain peak current	$I_{D(pulse)}$*[1]	64	A
Body to drain diode reverse drain current	I_{DR}	8	A
Channel dissipation	Pch*[2]	2.5	W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	–55 to +150	°C

Notes: 1. PW ≤ 10µs, duty cycle ≤ 1 %
2. When using the glass epoxy board (FR4 40 x 40 x 1.6 mm), PW≤ 10s

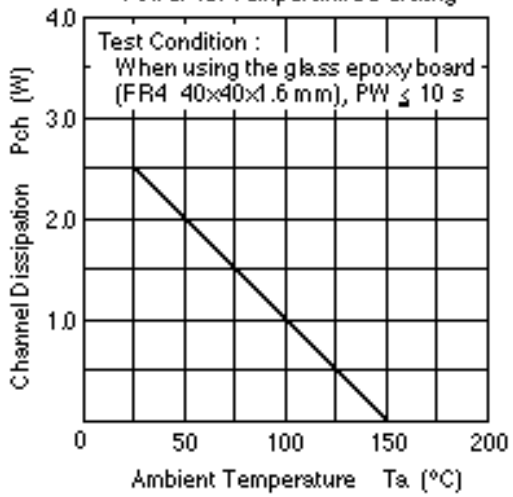
Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	30	—	—	V	I_D = 10mA, V_{GS} = 0
Gate to source breakdown voltage	$V_{(BR)GSS}$	±12	—	—	V	I_G = ±100µA, V_{DS} = 0
Gate to source leak current	I_{GSS}	—	—	±10	µA	V_{GS} = ±10V, V_{DS} = 0
Zero gate voltege drain current	I_{DSS}	—	—	10	µA	V_{DS} = 30 V, V_{GS} = 0
Gate to source cutoff voltage	$V_{GS(off)}$	0.5	—	1.5	V	V_{DS} = 10V, I_D = 1mA
Static drain to source on state resistance	$R_{DS(on)}$	—	0.020	0.027	Ω	I_D = 4A, V_{GS} = 4V*[1]
	$R_{DS(on)}$	—	0.027	0.037	Ω	I_D = 4A, V_{GS} = 2.5V*[1]
Forward transfer admittance	$\|y_{fs}\|$	10	16	—	S	I_D = 4A, V_{DS} = 10V*[1]
Input capacitance	Ciss	—	920	—	pF	V_{DS} = 10V
Output capacitance	Coss	—	550	—	pF	V_{GS} = 0
Reverse transfer capacitance	Crss	—	225	—	pF	f = 1MHz
Turn-on delay time	$t_{d(on)}$	—	25	—	ns	V_{GS} = 4V, I_D = 4A
Rise time	t_r	—	180	—	ns	V_{DD} 10V
Turn-off delay time	$t_{d(off)}$	—	165	—	ns	
Fall time	t_f	—	185	—	ns	
Body to drain diode forward voltage	V_{DF}	—	0.8	1.3	V	IF = 8A, V_{GS} = 0*[1]
Body to drain diode reverse recovery time	t_{rr}	—	60	—	ns	IF = 8A, V_{GS} = 0 diF/ dt =20A/µs

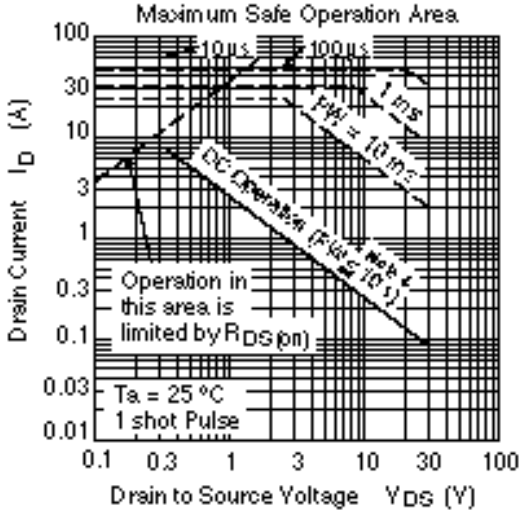
Note: 1. Pulse test

Main Characteristics

Power vs. Temperature Derating

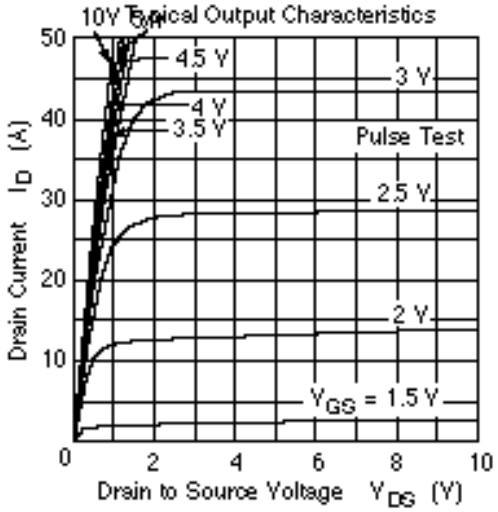


Maximum Safe Operation Area

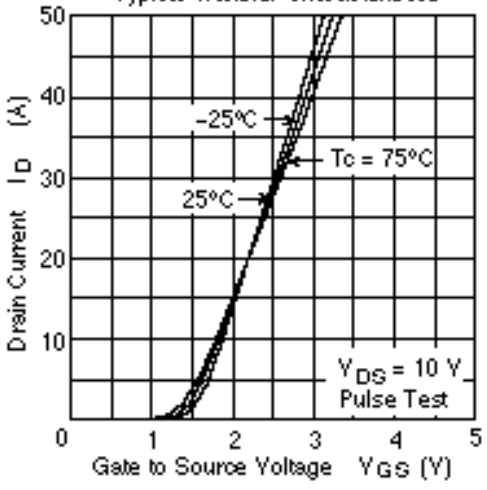


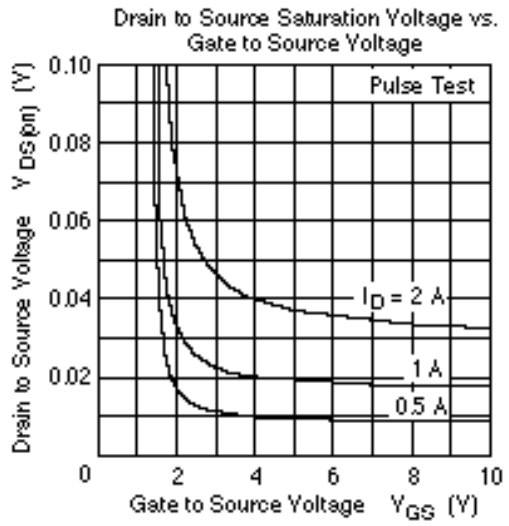
Note 4 :
When using the glass epoxy board
(FR4 40×40×1.6 mm)

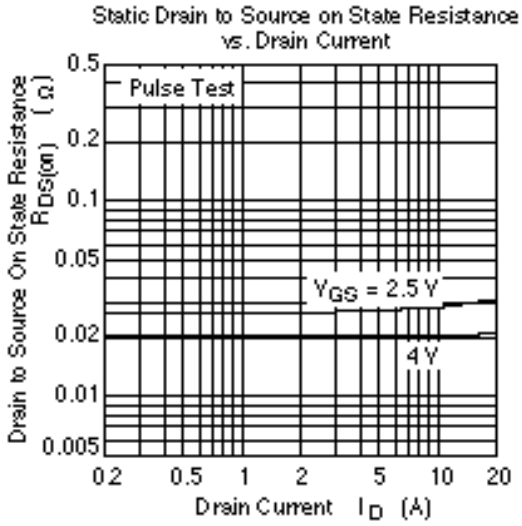
10V Typical Output Characteristics

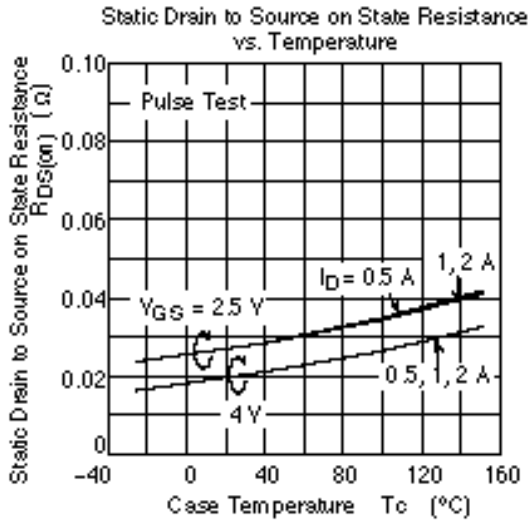


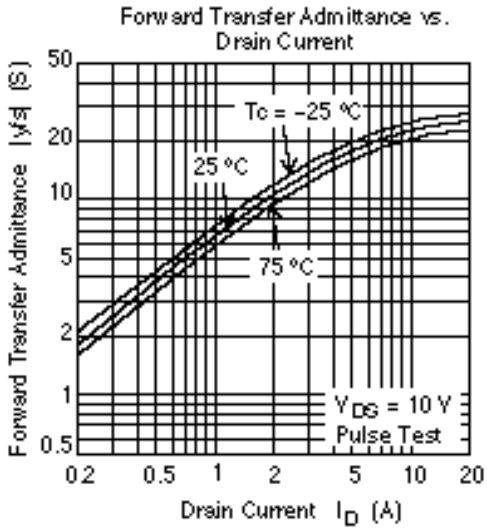
Typical Transfer Characteristics

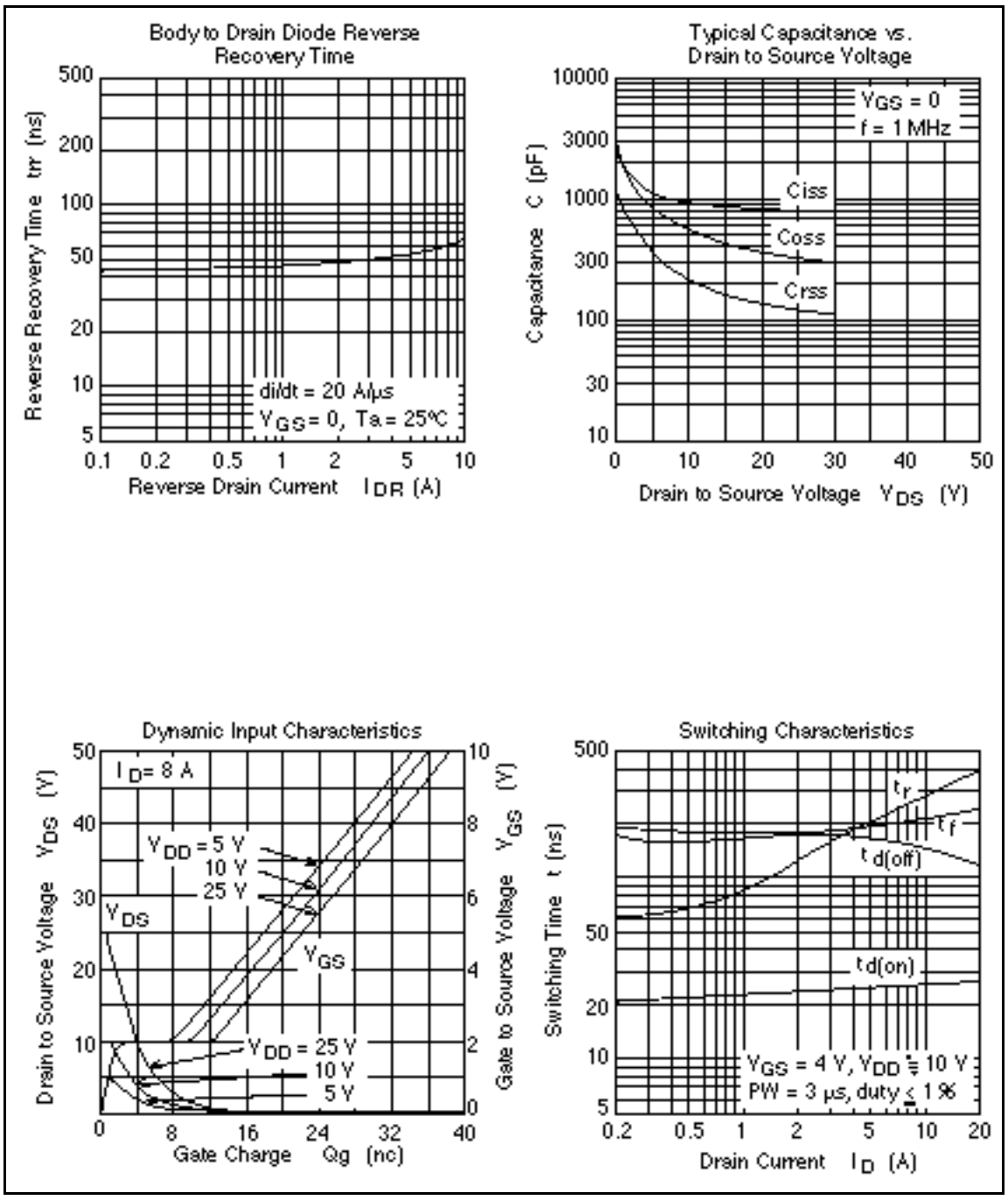


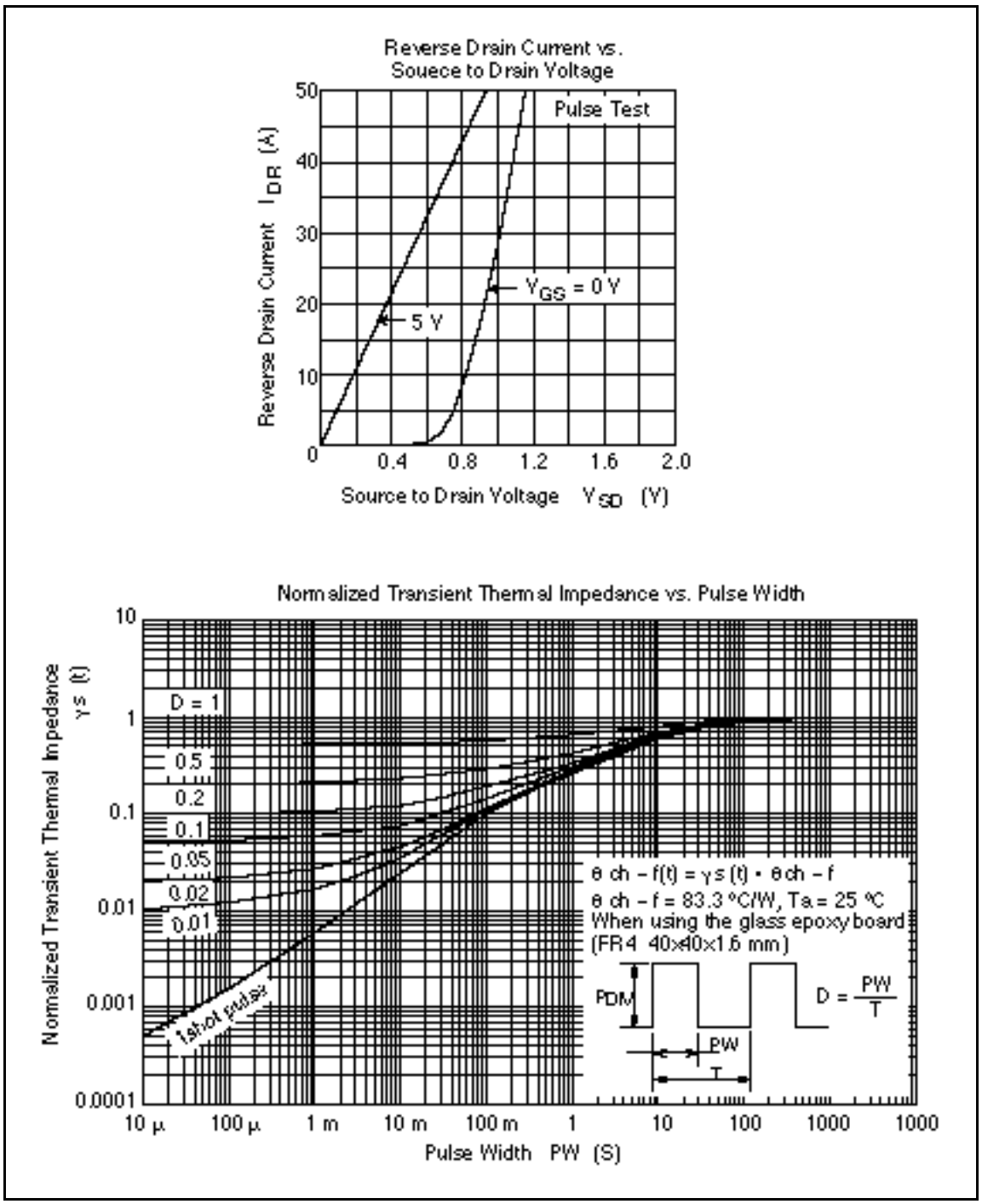

Drain to Source Saturation Voltage vs.
Gate to Source Voltage
Pulse Test
I_D = 2 A
1 A
0.5 A
Drain to Source Voltage $V_{DS(on)}$ (V)
Gate to Source Voltage V_{GS} (V)
0.10
0.08
0.06
0.04
0.02
0
2
4
6
8
10


Static Drain to Source on State Resistance
vs. Drain Current
Pulse Test
V_{GS} = 2.5 V
4 V
Drain to Source On State Resistance $R_{DS(on)}$ (Ω)
Drain Current I_D (A)
0.5
0.2
0.1
0.05
0.02
0.01
0.005
0.2
0.5
1
2
5
10
20

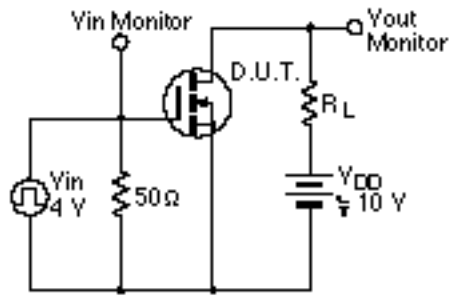

Static Drain to Source on State Resistance
vs. Temperature
Pulse Test
I_D = 0.5 A
1, 2 A
V_{GS} = 2.5 V
0.5, 1, 2 A
4 V
Static Drain to Source on State Resistance $R_{DS(on)}$ (Ω)
Case Temperature Tc (°C)
0.10
0.08
0.06
0.04
0.02
0
−40
0
40
80
120
160


Forward Transfer Admittance vs.
Drain Current
Tc = −25 °C
25 °C
75 °C
V_{DS} = 10 V
Pulse Test
Forward Transfer Admittance |yfs| (S)
Drain Current I_D (A)
50
20
10
5
2
1
0.5
0.2
0.5
1
2
5
10
20

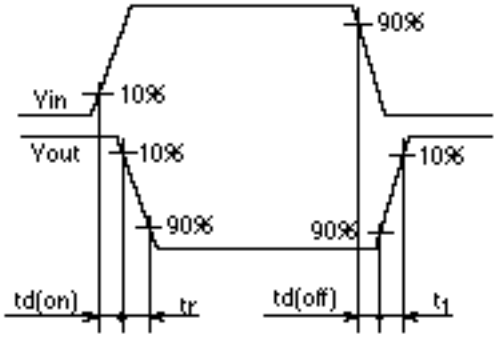

Body to Drain Diode Reverse Recovery Time
Reverse Recovery Time trr (ns)
500
200
100
50
20
10
5
di/dt = 20 A/µs
VGS = 0, Ta = 25°C
0.1 0.2 0.5 1 2 5 10
Reverse Drain Current IDR (A)
Typical Capacitance vs. Drain to Source Voltage
Capacitance C (pF)
10000
3000
1000
300
100
30
10
VGS = 0
f = 1 MHz
Ciss
Coss
Crss
0 10 20 30 40 50
Drain to Source Voltage VDS (V)
Dynamic Input Characteristics
Drain to Source Voltage VDS (V)
Gate to Source Voltage VGS (V)
ID = 8 A
VDD = 5 V
10 V
25 V
VDS
VGS
VDD = 25 V
10 V
5 V
0 8 16 24 32 40
Gate Charge Qg (nc)
Switching Characteristics
Switching Time t (ns)
500
50
20
10
5
tr
tf
td(off)
td(on)
VGS = 4 V, VDD ≒ 10 V
PW = 3 µs, duty ≦ 1 %
0.2 0.5 1 2 5 10 20
Drain Current ID (A)


Reverse Drain Current vs.
Souece to Drain Voltage
Pulse Test
Reverse Drain Current I_{DR} (A)
V_{GS} = 0 V
5 V
Source to Drain Voltage V_{SD} (V)
Normalized Transient Thermal Impedance vs. Pulse Width
Normalized Transient Thermal Impedance γs (t)
D = 1
0.5
0.2
0.1
0.05
0.02
0.01
1shot pulse
θch – f(t) = γs (t) • θch – f
θch – f = 83.3 °C/W, Ta = 25 °C
When using the glass epoxy board
(FR4 40×40×1.6 mm)
PDM
D = PW/T
PW
T
Pulse Width PW (S)

Switching Time Test Circuit

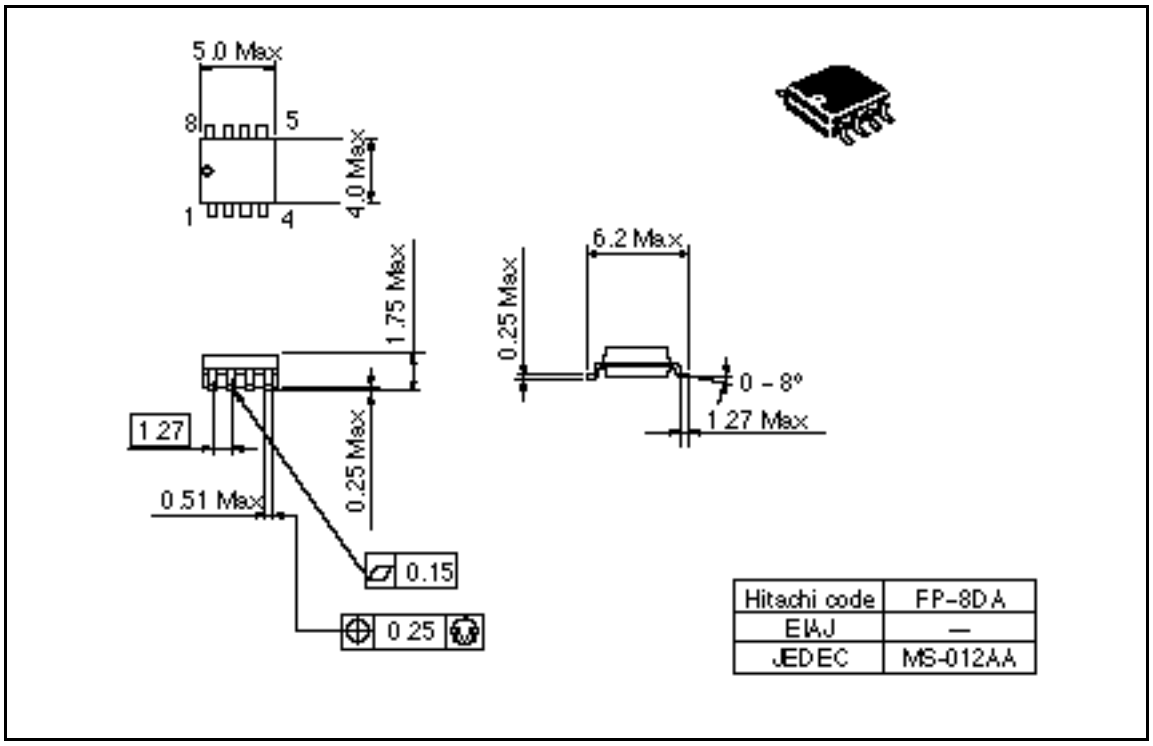


Switching Time Waveform



Package Dimensions

Unit: mm



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