To all our customers

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Renesas Technology Home Page: http://www.renesas.com

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

Cautions

2SK2725

Silicon N Channel MOS FET
High Speed Power Switching

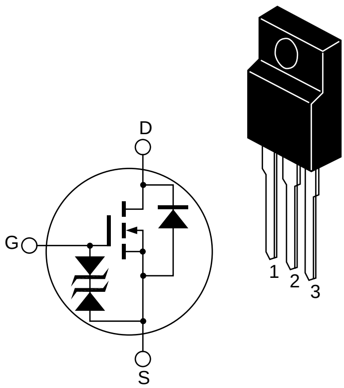
ADE-208-452B (Z)
3rd. Edition
Sep. 1997

Features

- Low on-resistance
- High speed switching
- Low drive current
- No secondary breakdown
- Avalanche ratings

Outline

TO–220CFM



1. Gate
2. Drain
3. Source

Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DSS}	500	V
Gate to source voltage	V_{GSS}	±30	V
Drain current	I_D	5	A
Drain peak current	$I_{D(pulse)}$ *[1]	20	A
Body to drain diode reverse drain current	I_{DR}	5	A
Avalanche current	I_{AP} *[3]	5	A
Avalanche energy	E_{AR} *[3]	1.38	mJ
Channel dissipation	Pch*[2]	30	W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	–55 to +150	°C

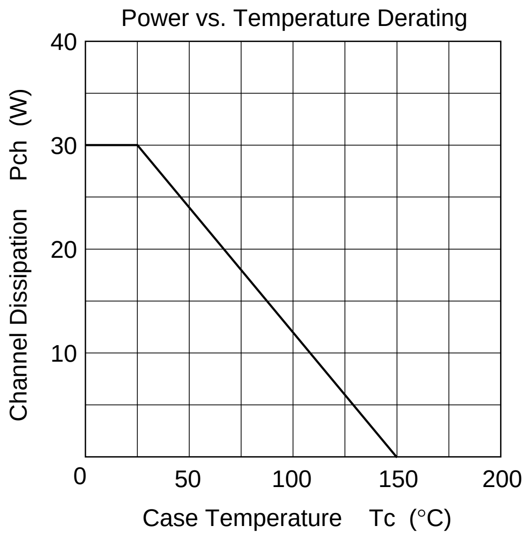
Notes: 1. PW ≤ 10µs, duty cycle ≤ 1 %
2. Value at Tc = 25°C
3. Value at Tch = 25°C, Rg ≥ 50Ω

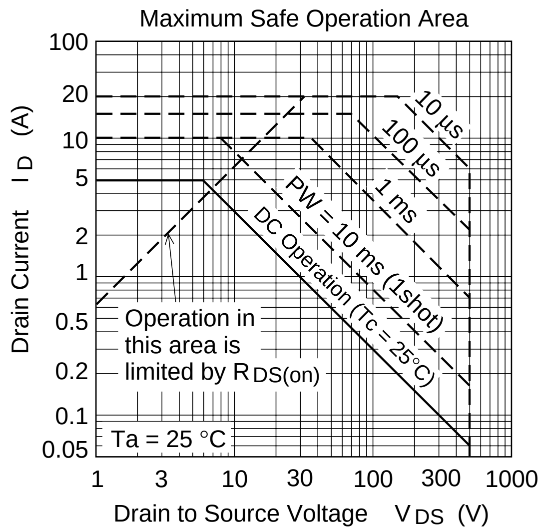
Electrical Characteristics (Ta = 25°C)

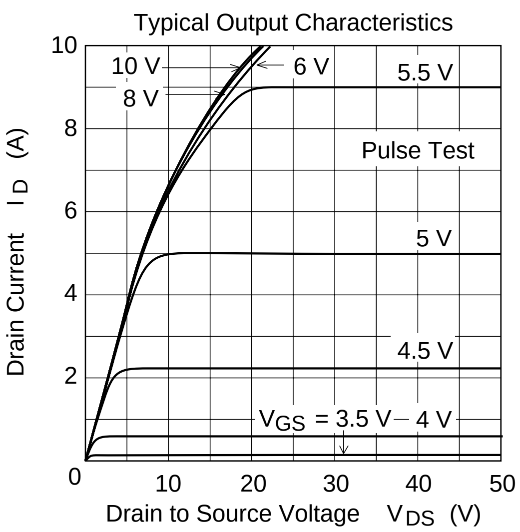
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	500	—	—	V	I_D = 10mA, V_{GS} = 0
Gate to source breakdown voltage	$V_{(BR)GSS}$	±30	—	—	V	I_G = ±100µA, V_{DS} = 0
Gate to source leak current	I_{GSS}	—	—	±10	µA	V_{GS} = ±25V, V_{DS} = 0
Zero gate voltege drain current	I_{DSS}	—	—	10	µA	V_{DS} = 500 V, V_{GS} = 0
Gate to source cutoff voltage	$V_{GS(off)}$	2.5	—	3.5	V	I_D = 1mA, V_{DS} = 10V*[1]
Static drain to source on state resistance	$R_{DS(on)}$	—	1.2	1.6	Ω	I_D = 3A, V_{GS} = 10V*[1]
Forward transfer admittance	$\|y_{fs}\|$	2.5	4.5	—	S	I_D = 3A, V_{DS} = 10V*[1]
Input capacitance	Ciss	—	630	—	pF	V_{DS} = 10V
Output capacitance	Coss	—	250	—	pF	V_{GS} = 0
Reverse transfer capacitance	Crss	—	55	—	pF	f = 1MHz
Total gate charge	Qg	—	13.5	—	nc	V_{DD} = 400V
Gate to source charge	Qgs	—	3.5	—	nc	V_{GS} = 10V
Gate to drain charge	Qgd	—	5.0	—	nc	I_D = 5A
Turn-on delay time	$t_{d(on)}$	—	11	—	ns	V_{GS} = 10V, I_D = 3A
Rise time	t_r	—	45	—	ns	R_L = 10Ω
Turn-off delay time	$t_{d(off)}$	—	40	—	ns	
Fall time	t_f	—	50	—	ns	
Body to drain diode forward voltage	V_{DF}	—	0.95	—	V	I_D = 5A, V_{GS} = 0
Body to drain diode reverse recovery time	t_{rr}	—	200	—	ns	I_F = 5A, V_{GS} = 0 diF/ dt = 100A/µs

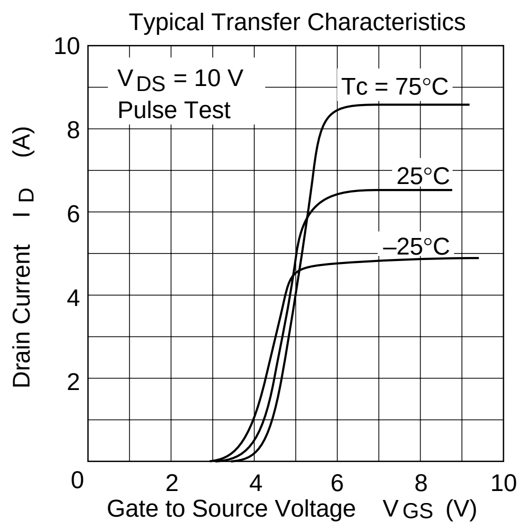
Note: 1. Pulse test

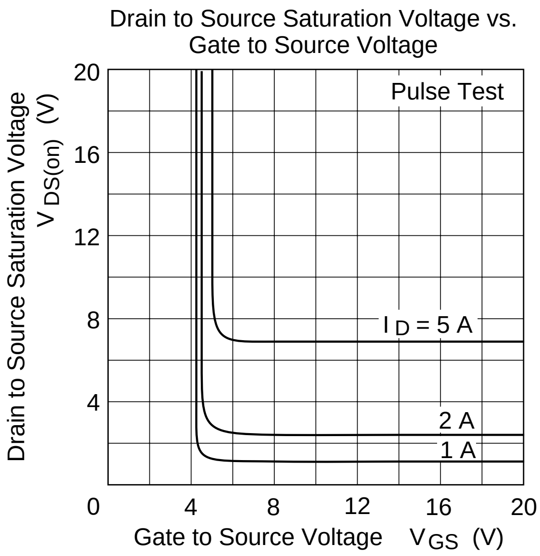
Main Characteristics

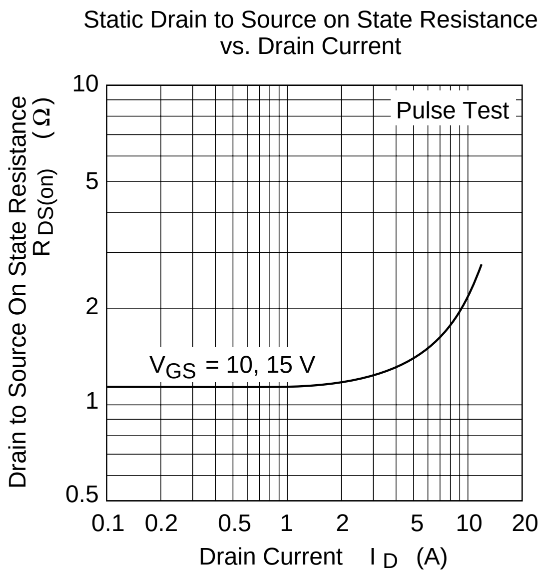


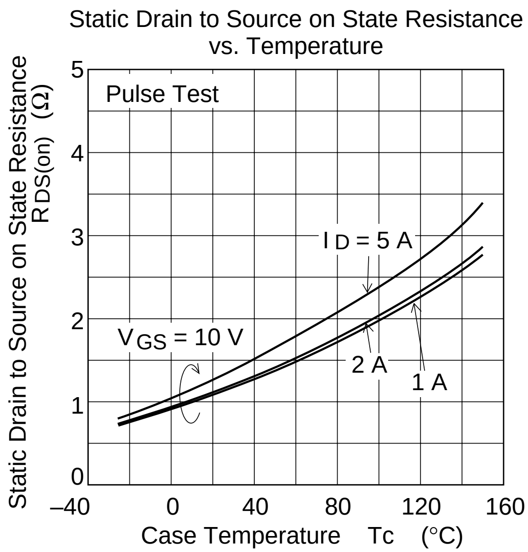


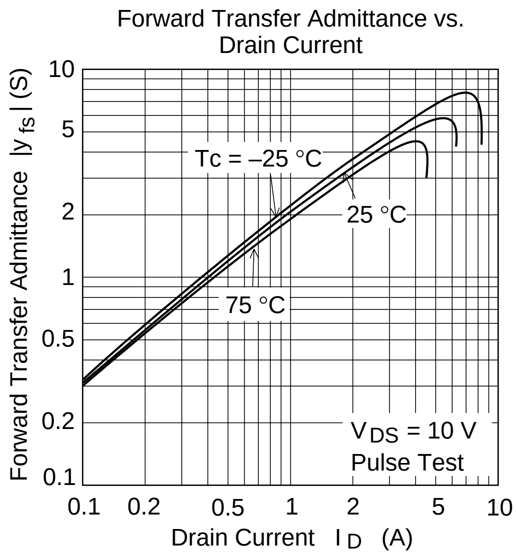


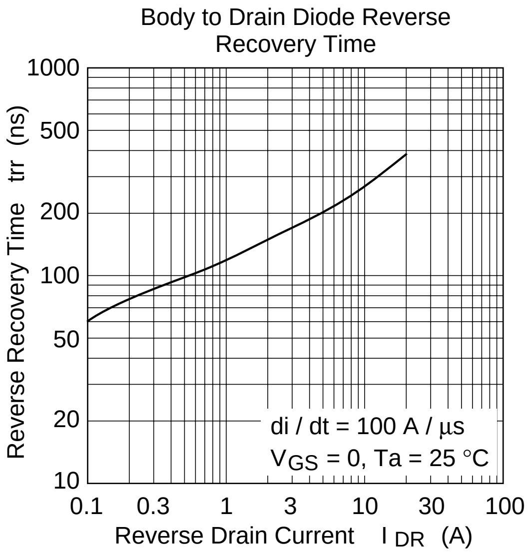


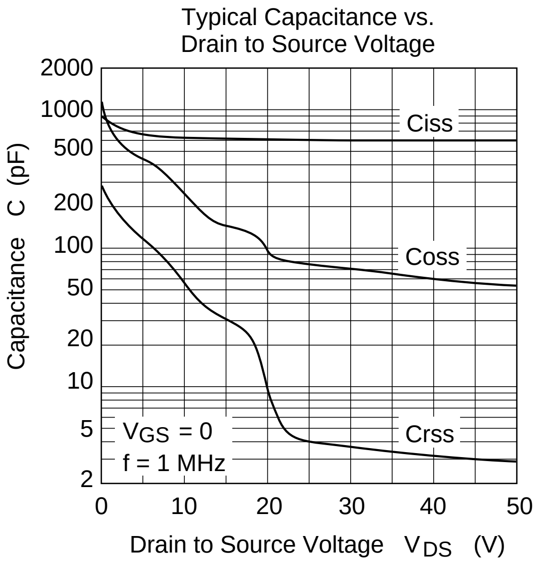

Drain to Source Saturation Voltage vs.
Gate to Source Voltage
Pulse Test
I D = 5 A
2 A
1 A
Drain to Source Saturation Voltage
V DS(on) (V)
20
16
12
8
4
0
4
8
12
16
20
Gate to Source Voltage V GS (V)

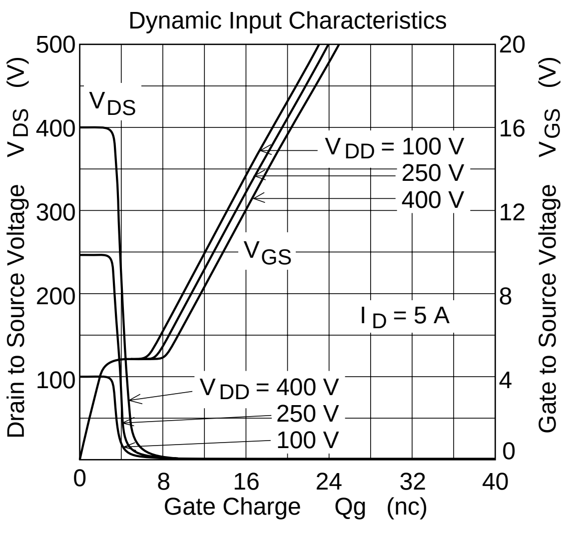

Static Drain to Source on State Resistance
vs. Drain Current
Pulse Test
V GS = 10, 15 V
Drain to Source On State Resistance
R DS(on) (Ω)
10
5
2
1
0.5
0.1
0.2
0.5
1
2
5
10
20
Drain Current I D (A)

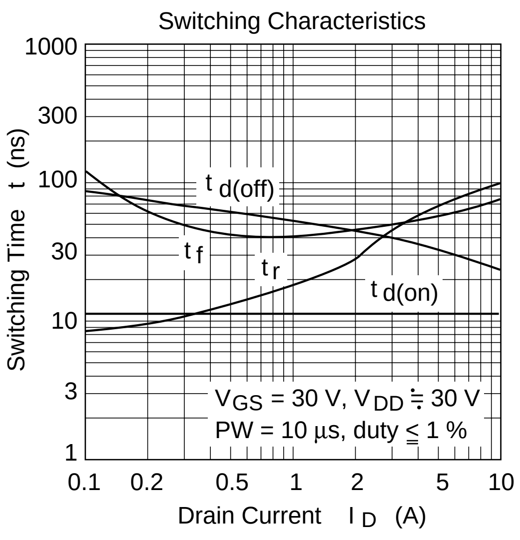

Static Drain to Source on State Resistance
vs. Temperature
Pulse Test
I D = 5 A
V GS = 10 V
2 A
1 A
Static Drain to Source on State Resistance
R DS(on) (Ω)
5
4
3
2
1
0
–40
0
40
80
120
160
Case Temperature Tc (°C)


Forward Transfer Admittance vs.
Drain Current
Tc = –25 °C
25 °C
75 °C
V DS = 10 V
Pulse Test
Forward Transfer Admittance |y fs| (S)
10
5
2
1
0.5
0.2
0.1
0.1
0.2
0.5
1
2
5
10
Drain Current I D (A)

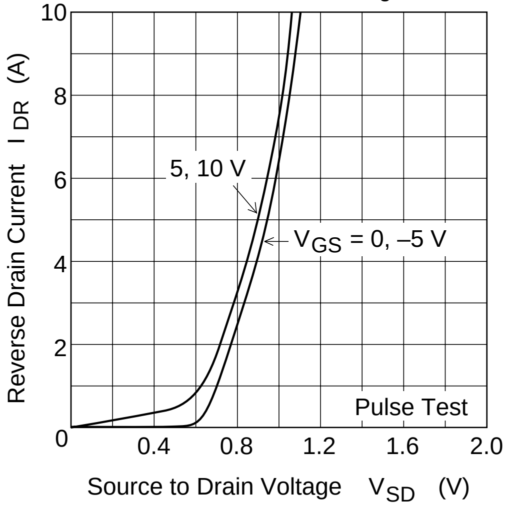

Body to Drain Diode Reverse
Recovery Time
Reverse Recovery Time trr (ns)
1000
500
200
100
50
20
10
0.1
0.3
1
3
10
30
100
Reverse Drain Current I DR (A)
di / dt = 100 A / µs
VGS = 0, Ta = 25 °C


Typical Capacitance vs.
Drain to Source Voltage
Capacitance C (pF)
2000
1000
500
200
100
50
20
10
5
2
0
10
20
30
40
50
Drain to Source Voltage VDS (V)
Ciss
Coss
Crss
VGS = 0
f = 1 MHz

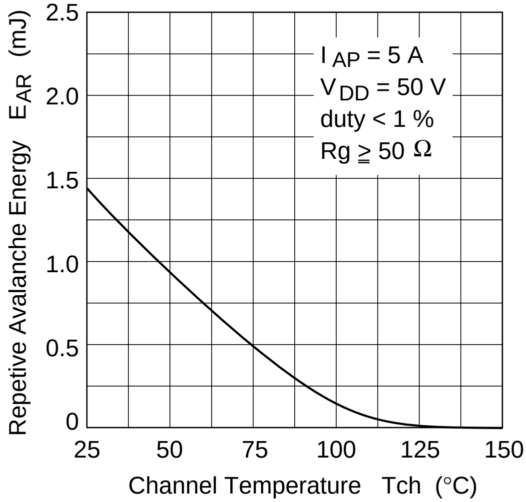

Dynamic Input Characteristics
Drain to Source Voltage VDS (V)
500
400
300
200
100
0
8
16
24
32
40
Gate Charge Qg (nc)
20
16
12
8
4
0
Gate to Source Voltage VGS (V)
VDS
VDD = 100 V
250 V
400 V
VGS
ID = 5 A
VDD = 400 V
250 V
100 V


Switching Characteristics
Switching Time t (ns)
1000
300
100
30
10
3
1
0.1
0.2
0.5
1
2
5
10
Drain Current ID (A)
t d(off)
t f
t r
t d(on)
VGS = 30 V, VDD ≒ 30 V
PW = 10 µs, duty ≦ 1 %

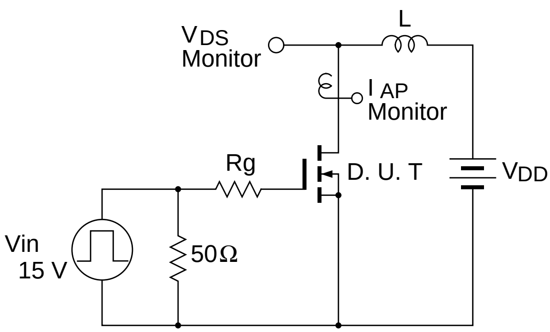
Reverse Drain Current vs.
Source to Drain Voltage



Maximum Avalanche Energy vs.
Channel Temperature Derating

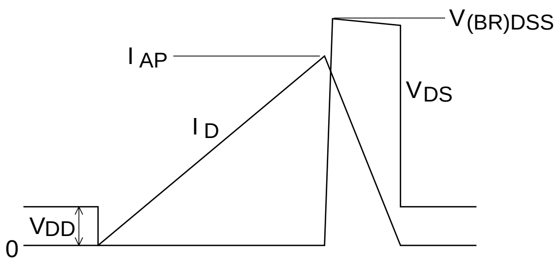


Avalanche Test Circuit

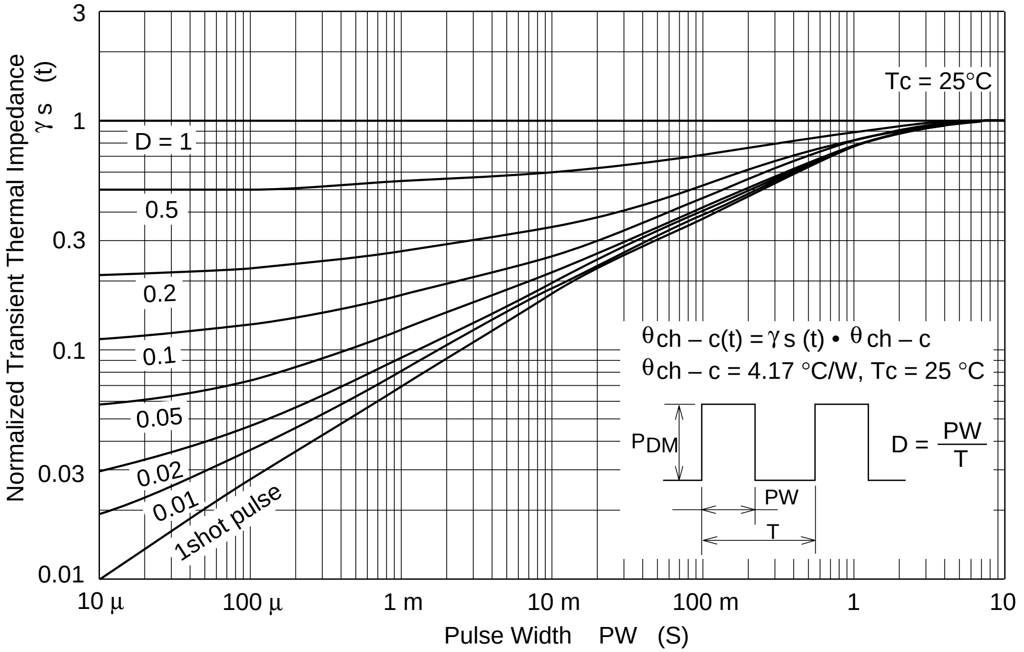


Avalanche Waveform

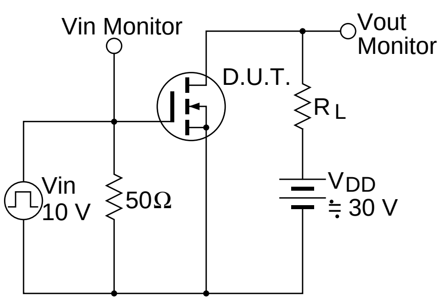
$$E_{AR} = \frac{1}{2} \bullet L \bullet I_{AP}^{2} \bullet \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$



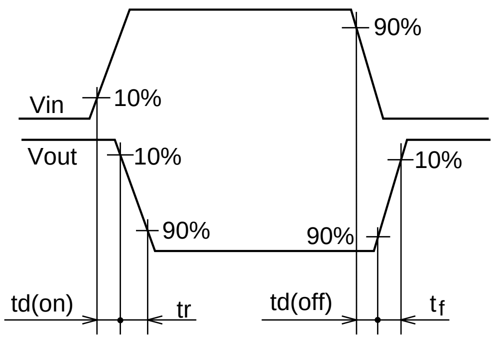
Normalized Transient Thermal Impedance vs. Pulse Width



Switching Time Test Circuit



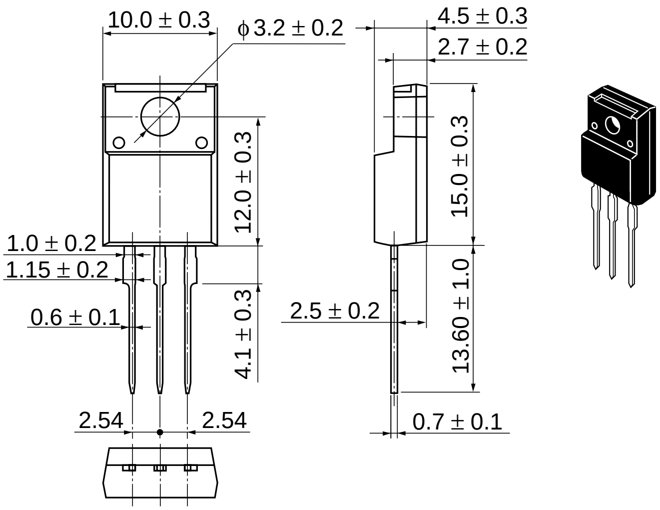
Switching Time Waveforms



Package Dimensions

As of January, 2001

Unit: mm



Hitachi Code	TO-220CFM
JEDEC	—
EIAJ	—
Mass (reference value)	1.9 g

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