2SK3076(L),2SK3076(S)

Silicon N Channel MOS FET
High Speed Power Switching

HITACHI

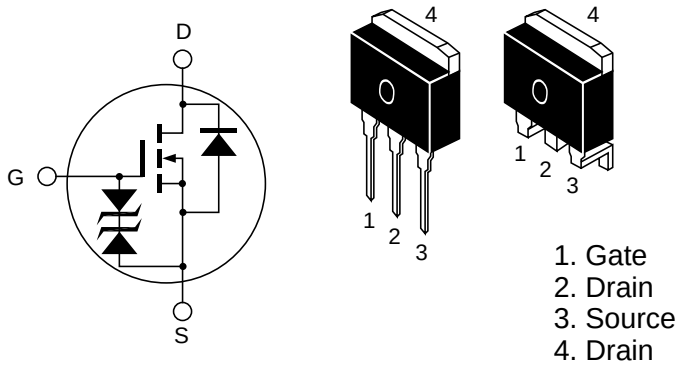
ADE-208-656 (Z)
1st. Edition
Jun 1998

Features

- Low on-resistance
- High speed switching
- Low drive current.
- Built-in fast recovery diode (trr=120 ns)

Outline

LDPAK



Hitachi semiconductor

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	7	A
Drain peak current	$I_{D(pulse)}$ Note1	28	A
Body-drain diode reverse drain current	I_{DR}	7	A
Channel dissipation	Pch Note2	60	W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	–55 to +150	°C

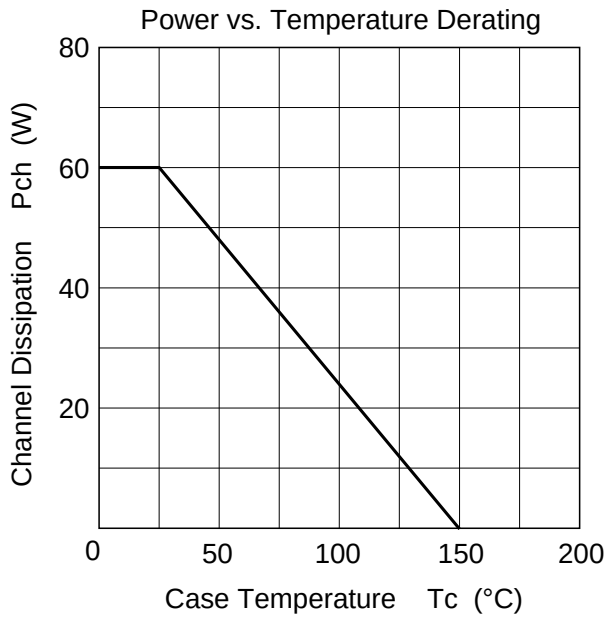
Note: 1. PW ≤ 10µs, duty cycle ≤ 1 %
2. Value at Tc = 25°C

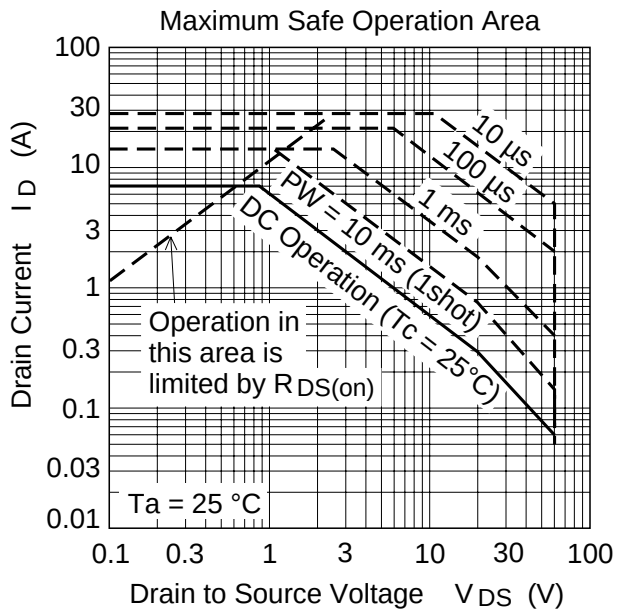
Electrical Characteristics (Ta = 25°C)

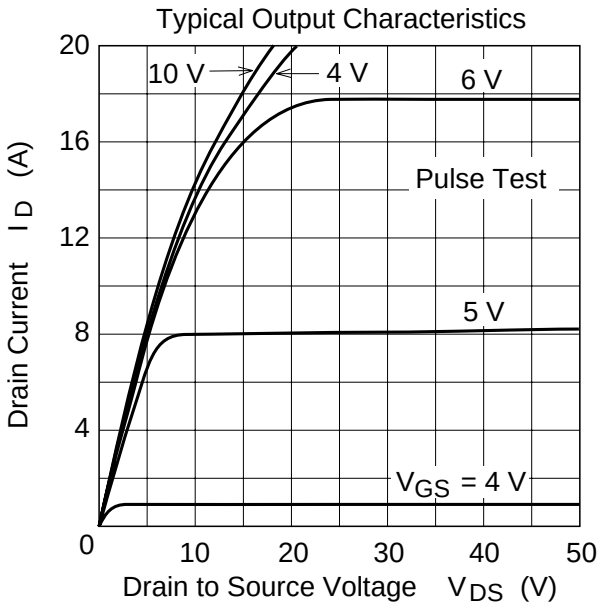
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	500	—	—	V	I_D = 10mA, V_{GS} = 0
Gate to source breakdown voltage	$V_{(BR)GSS}$	±30	—	—	V	I_G = ±100µA, V_{DS} = 0
Gate to source leak current	I_{GSS}	—	—	±10	µA	V_{GS} = ±25V, V_{DS} = 0
Zero gate voltege drain current	I_{DSS}	—	—	250	µA	V_{DS} = 400 V, V_{GS} = 0
Gate to source cutoff voltage	$V_{GS(off)}$	2.0	—	3.0	V	I_D = 1mA, V_{DS} = 10V
Static drain to source on state resistance	$R_{DS(on)}$	—	0.7	0.9	Ω	I_D = 4A, V_{GS} = 10V Note4
Forward transfer admittance	$\|y_{fs}\|$	3.5	6.0	—	S	I_D = 4A, V_{DS} = 10V Note4
Input capacitance	Ciss	—	1100	—	pF	V_{DS} = 10V
Output capacitance	Coss	—	310	—	pF	V_{GS} = 0
Reverse transfer capacitance	Crss	—	50	—	pF	f = 1MHz
Turn-on delay time	$t_{d(on)}$	—	15	—	ns	I_D =4A, V_{GS} = 10V
Rise time	t_r	—	55	—	ns	R_L = 7.5Ω
Turn-off delay time	$t_{d(off)}$	—	100	—	ns	
Fall time	t_f	—	48	—	ns	
Body–drain diode forward voltage	V_{DF}	—	0.9	—	V	I_F = 7A, V_{GS} = 0
Body–drain diode reverse recovery time	t_{rr}	—	120	—	ns	I_F = 7A, V_{GS} = 0 diF/ dt =100A/µs

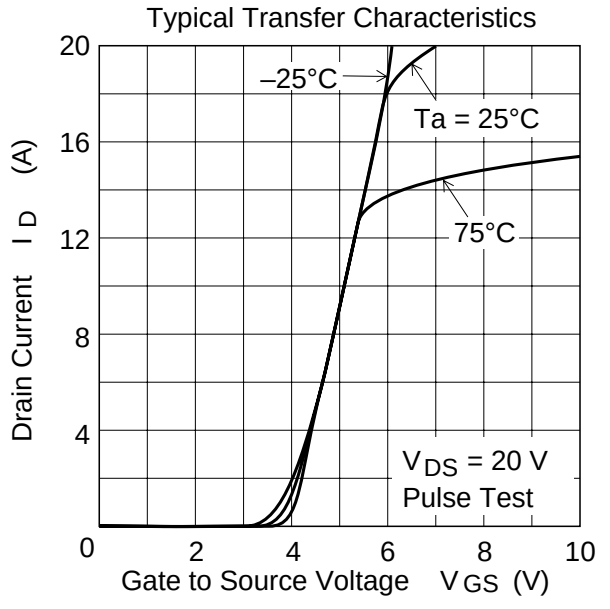
Note: 4. Pulse test

Main Characteristics

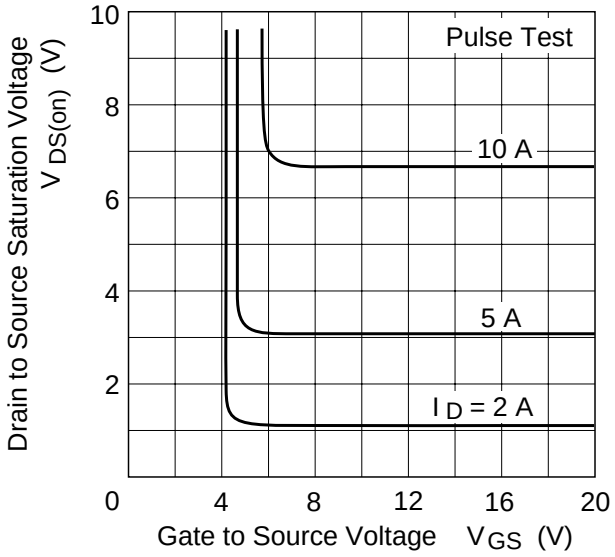




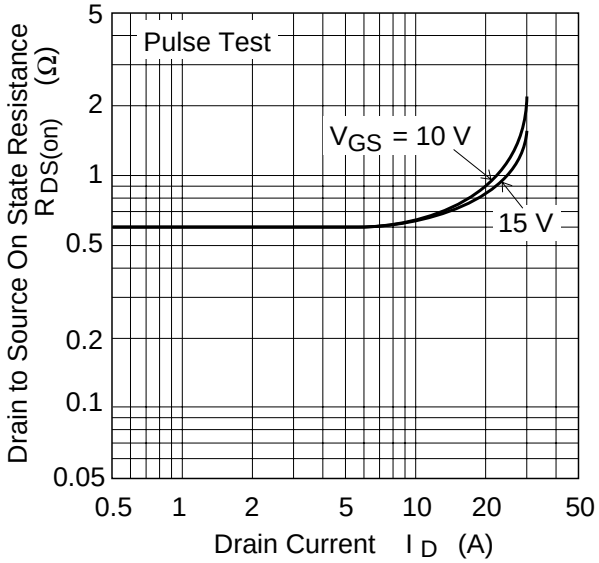




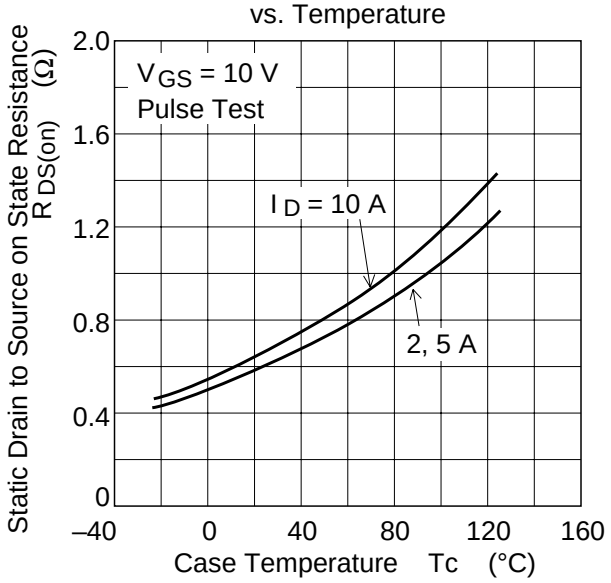
Drain to Source Saturation Voltage vs. Gate to Source Voltage



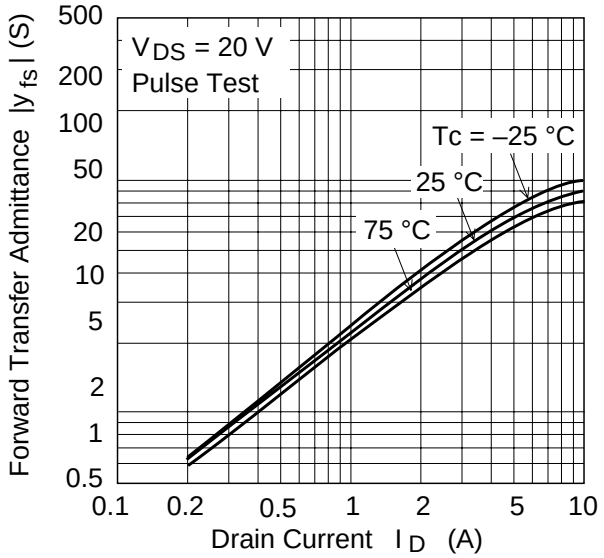
Static Drain to Source on State Resistance vs. Drain Current

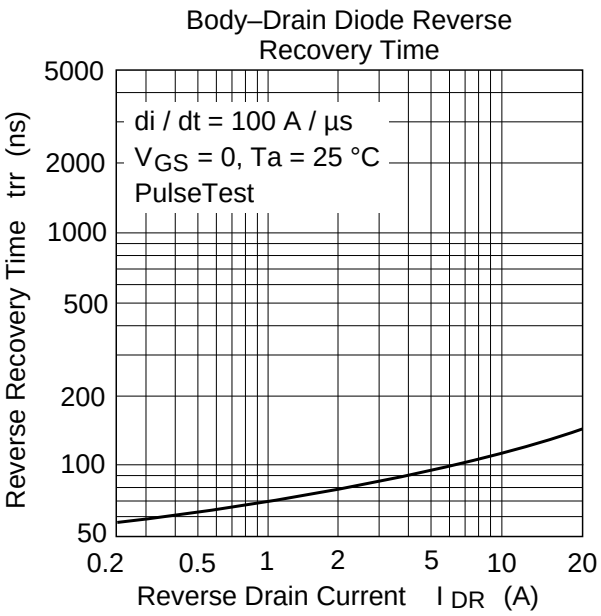


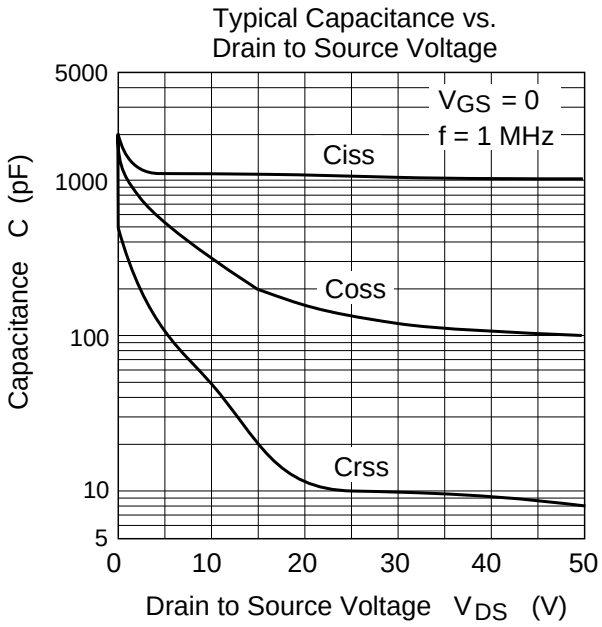
Static Drain to Source on State Resistance vs. Temperature

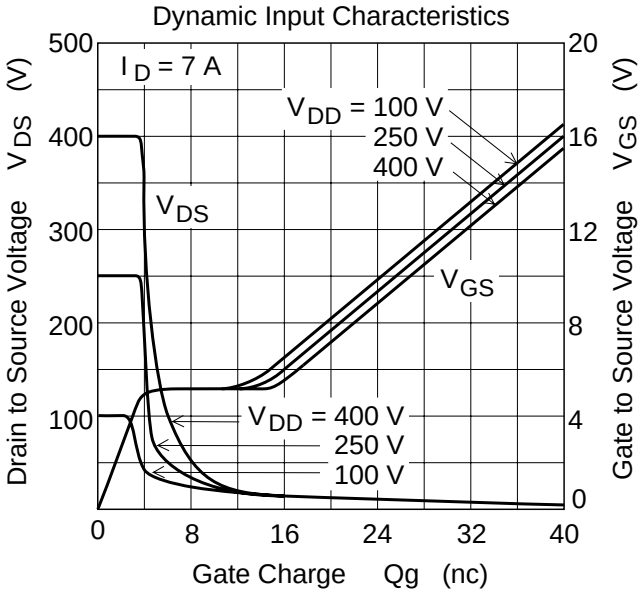


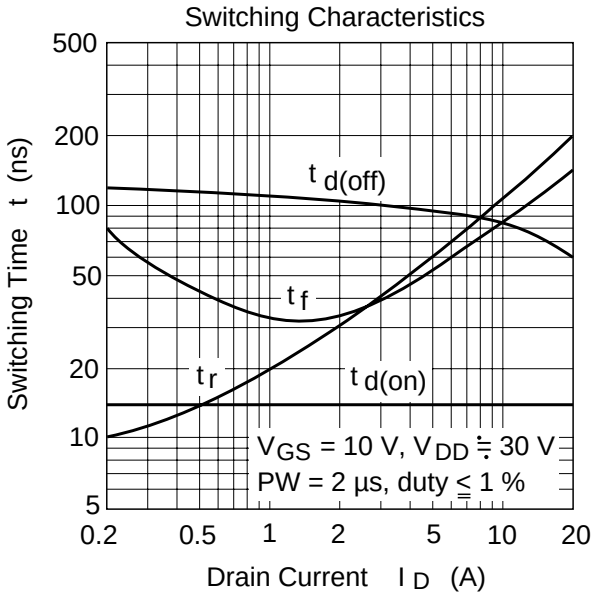
Forward Transfer Admittance vs. Drain Current

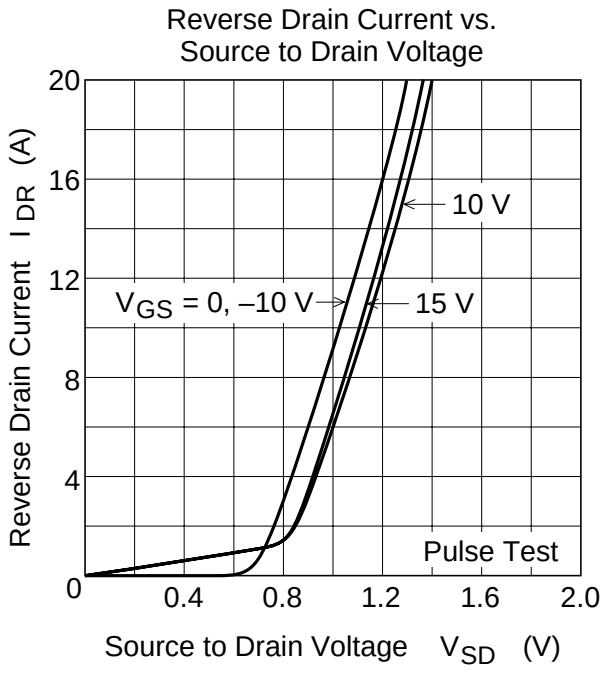


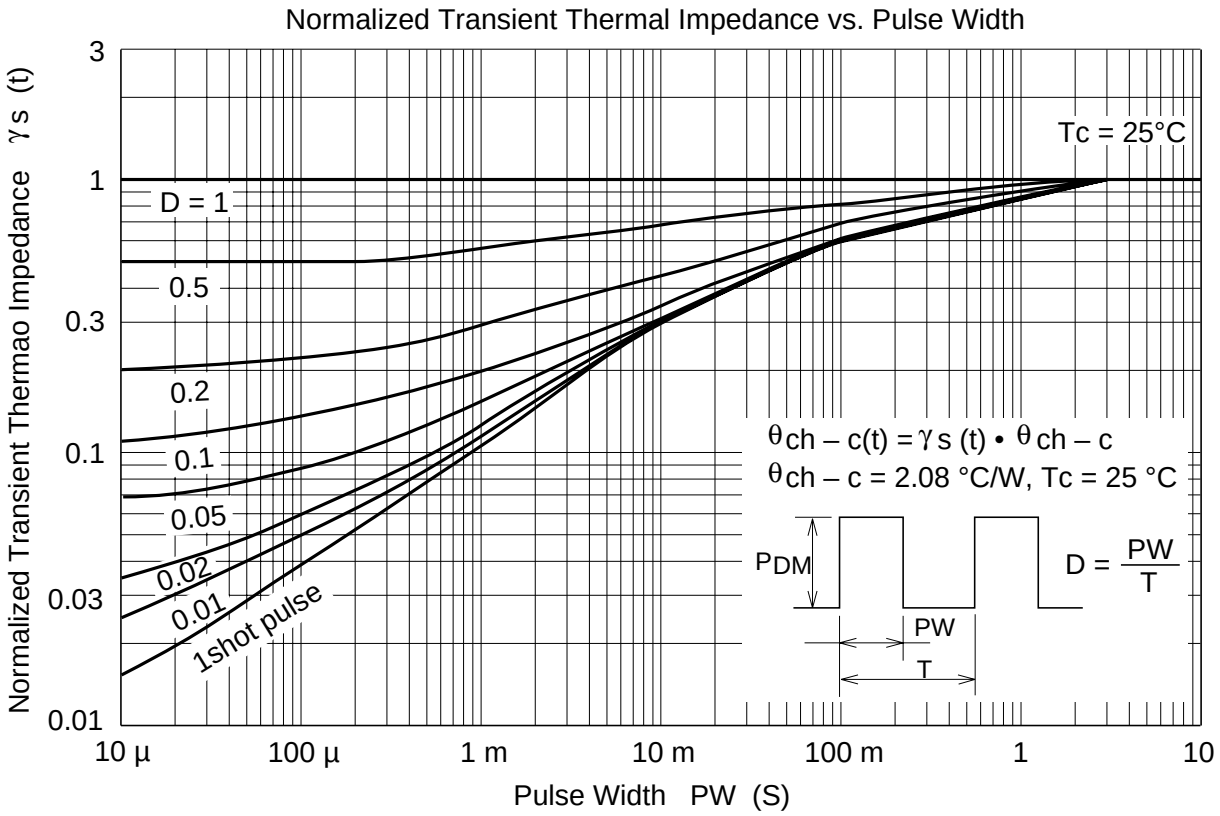

Body–Drain Diode Reverse Recovery Time
di / dt = 100 A / µs
VGS = 0, Ta = 25 °C
PulseTest
Reverse Recovery Time trr (ns)
5000
2000
1000
500
200
100
50
0.2
0.5
1
2
5
10
20
Reverse Drain Current I DR (A)


Typical Capacitance vs. Drain to Source Voltage
VGS = 0
f = 1 MHz
Ciss
Coss
Crss
Capacitance C (pF)
5000
1000
100
10
5
0
10
20
30
40
50
Drain to Source Voltage V DS (V)

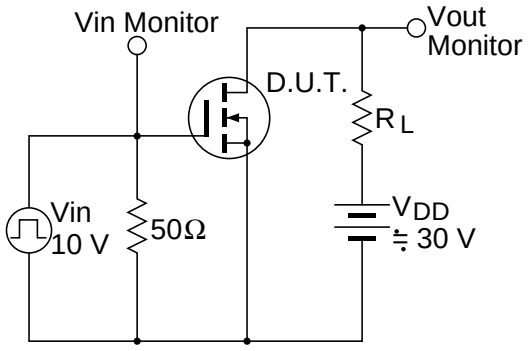

Dynamic Input Characteristics
I D = 7 A
VDD = 100 V
250 V
400 V
VDS
VGS
VDD = 400 V
250 V
100 V
Drain to Source Voltage V DS (V)
Gate to Source Voltage VGS (V)
500
400
300
200
100
20
16
12
8
4
0
0
8
16
24
32
40
Gate Charge Qg (nc)


Switching Characteristics
t d(off)
t f
t r
t d(on)
VGS = 10 V, VDD ≒ 30 V
PW = 2 µs, duty ≦ 1 %
Switching Time t (ns)
500
200
100
50
20
10
5
0.2
0.5
1
2
5
10
20
Drain Current I D (A)

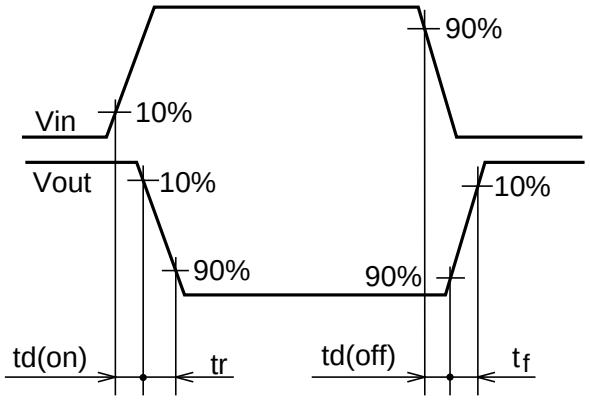

Reverse Drain Current vs.
Source to Drain Voltage
Reverse Drain Current I DR (A)
20
16
12
8
4
0
0.4
0.8
1.2
1.6
2.0
10 V
VGS = 0, –10 V
15 V
Pulse Test
Source to Drain Voltage VSD (V)


Normalized Transient Thermal Impedance vs. Pulse Width
Normalized Transient Thermao Impedance γs (t)
3
1
0.3
0.1
0.03
0.01
Tc = 25°C
D = 1
0.5
0.2
0.1
0.05
0.02
0.01
1shot pulse
θch – c(t) = γs (t) • θch – c
θch – c = 2.08 °C/W, Tc = 25 °C
PDM
D = PW/T
PW
T
10 μ
100 μ
1 m
10 m
100 m
1
10
Pulse Width PW (S)

Switching Time Test Circuit

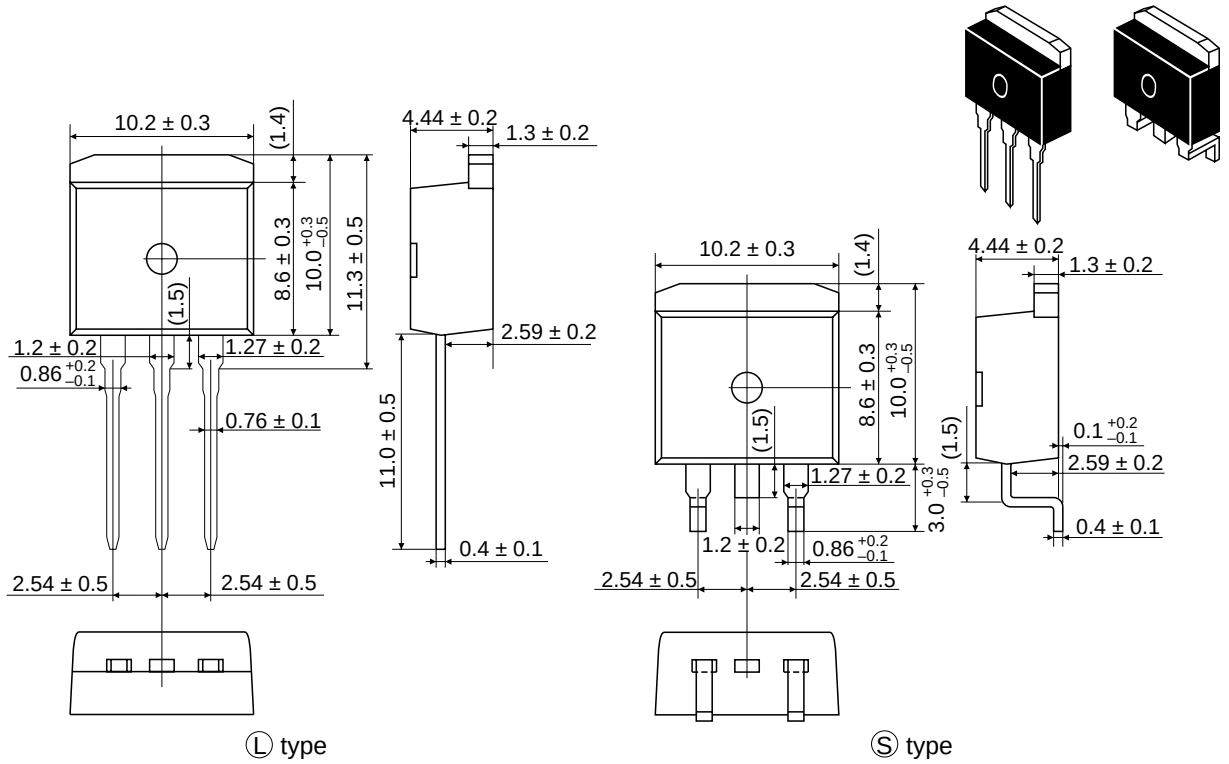


Waveform



Package Dimensions

Unit: mm



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