2SJ506(L), 2SJ506(S)

Silicon P Channel MOS FET
High Speed Power Switching

HITACHI

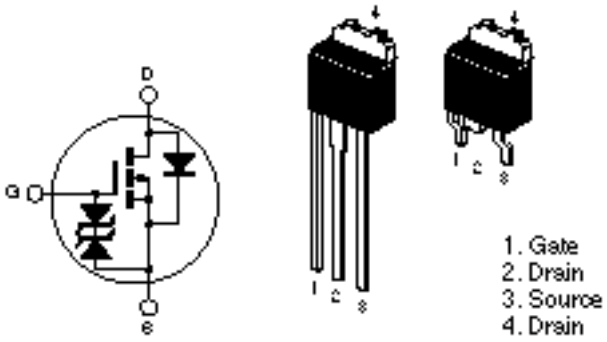
ADE-208-548
Target Specification 1st. Edition

Features

- Low on-resistance
  $R_{DS(on)}$ = 0.065 Ω typ. (at V_{GS} = –10V, I_D = –5A)
- Low drive current
- High speed switching
- 4V gate drive devices.

Outline

DPAK–2



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	–10	A
Drain peak current	$I_{D(pulse)}$ Note1	–40	A
Body to drain diode reverse drain current	I_{DR}	–10	A
Channel dissipation	Pch Note2	20	W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	–55 to +150	°C

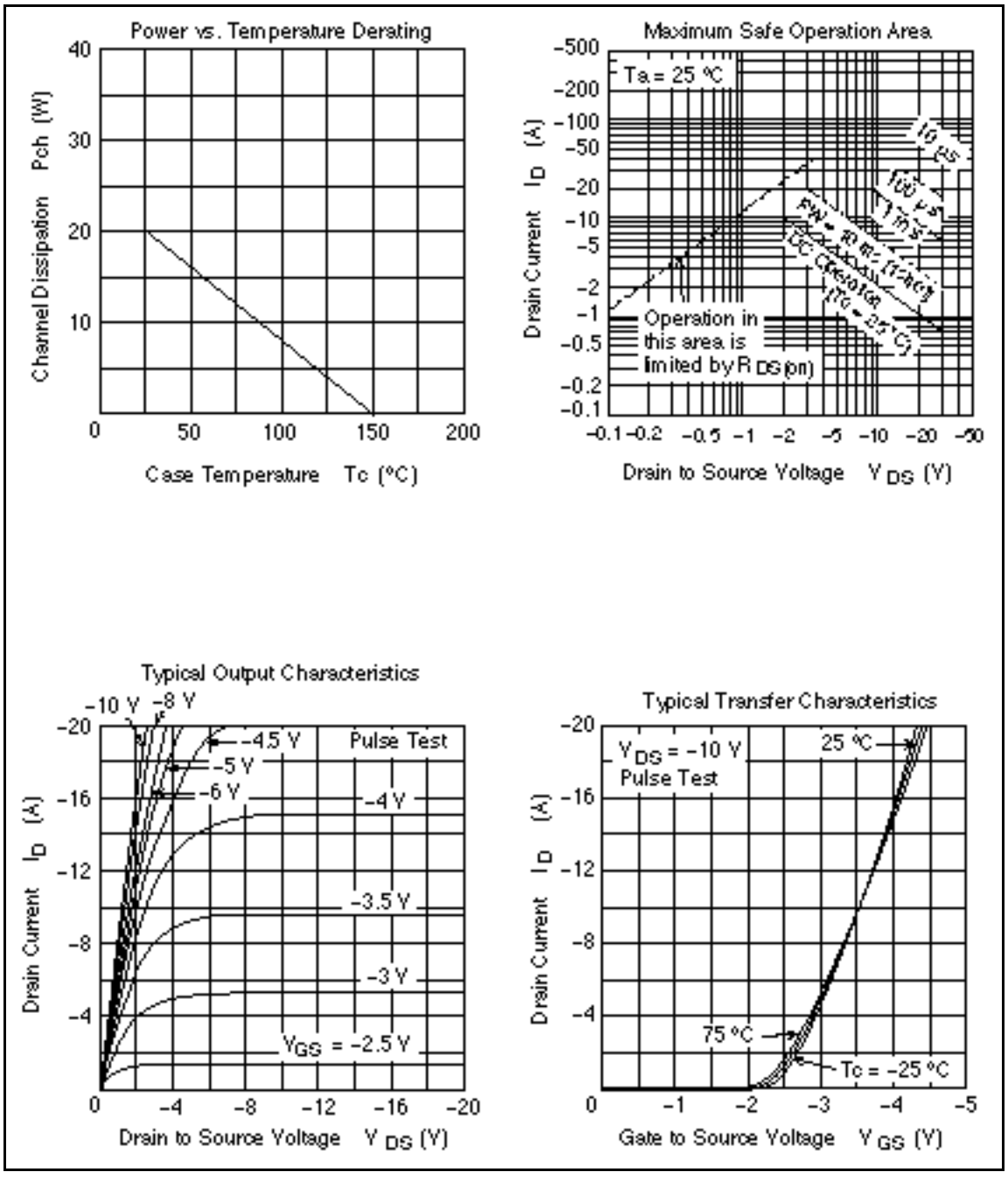
Notes: 1. PW ≤ 10µs, duty cycle ≤ 1 %
2. Value at Tc = 25°C

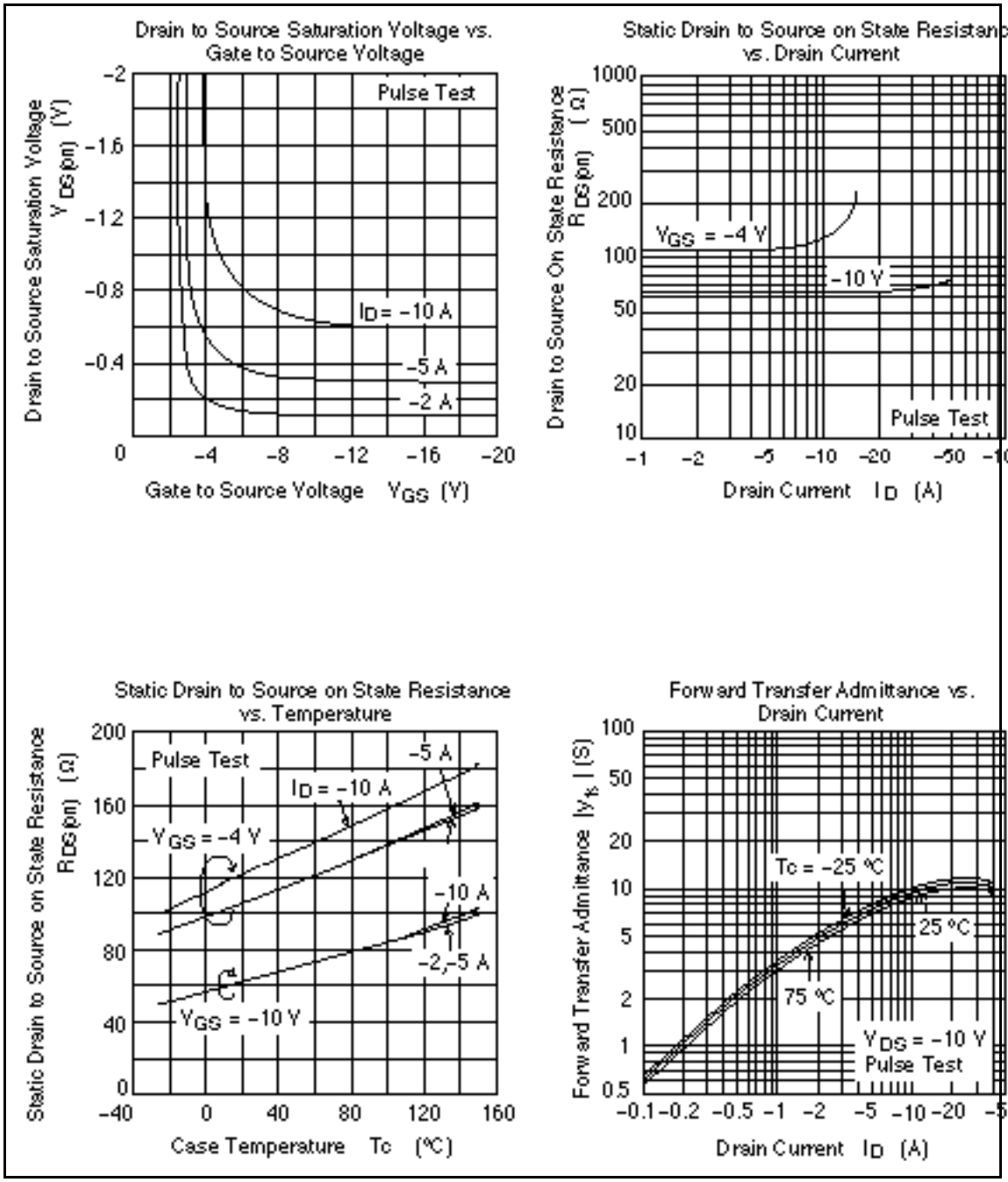
Electrical Characteristics (Ta = 25°C)

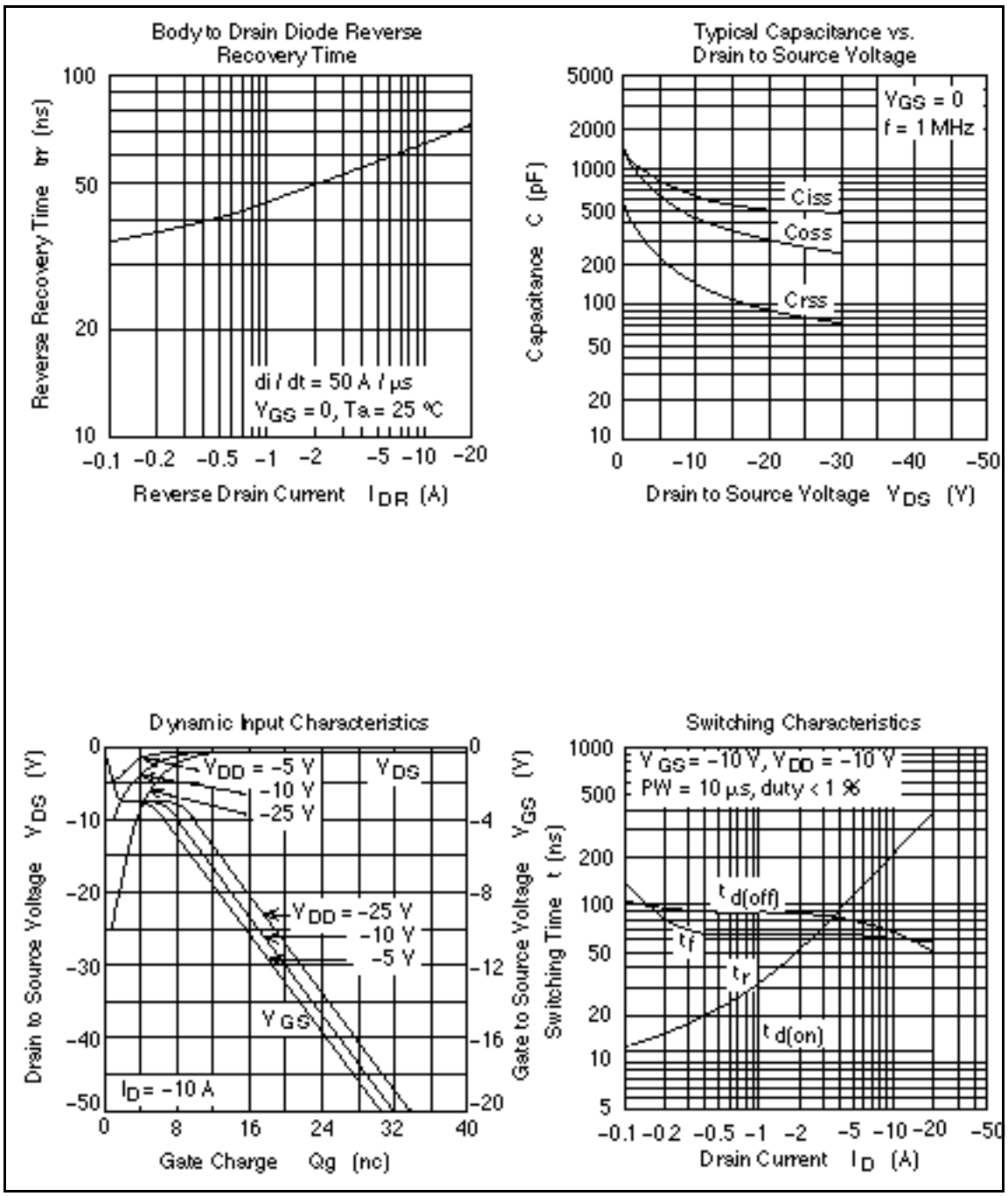
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	–30	—	—	V	I_D = –10mA, V_{GS} = 0
Gate to source breakdown voltage	$V_{(BR)GSS}$	±20	—	—	V	I_G = ±100µA, V_{DS} = 0
Zero gate voltege drain current	I_{DSS}	—	—	–10	µA	V_{DS} = –30 V, V_{GS} = 0
Gate to source 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	$R_{DS(on)}$	—	65	85	mΩ	I_D = –5A, V_{GS} = –10V Note3
	$R_{DS(on)}$	—	110	180	mΩ	I_D = –5A, V_{GS} = –4V Note3
Forward transfer admittance	$\|y_{fs}\|$	10	16	—	S	I_D = –5A, V_{DS} = –10V Note3
Input capacitance	Ciss	—	660	—	pF	V_{DS} = –10V
Output capacitance	Coss	—	440	—	pF	V_{GS} = 0
Reverse transfer capacitance	Crss	—	140	—	pF	f = 1MHz
Turn-on delay time	$t_{d(on)}$	—	12	—	ns	I_D = –5A, R_L = 2Ω
Rise time	t_r	—	65	—	ns	V_{GS} = –10V
Turn-off delay time	$t_{d(off)}$	—	85	—	ns	
Fall time	t_f	—	65	—	ns	
Body to drain diode forward voltage	V_{DF}	—	–1.05	—	V	I_F = –10A, V_{GS} = 0
Body to drain diode reverse recovery time	t_{rr}	—	65	—	ns	I_F = –10A, V_{GS} = 0 diF/ dt = 50A/µs

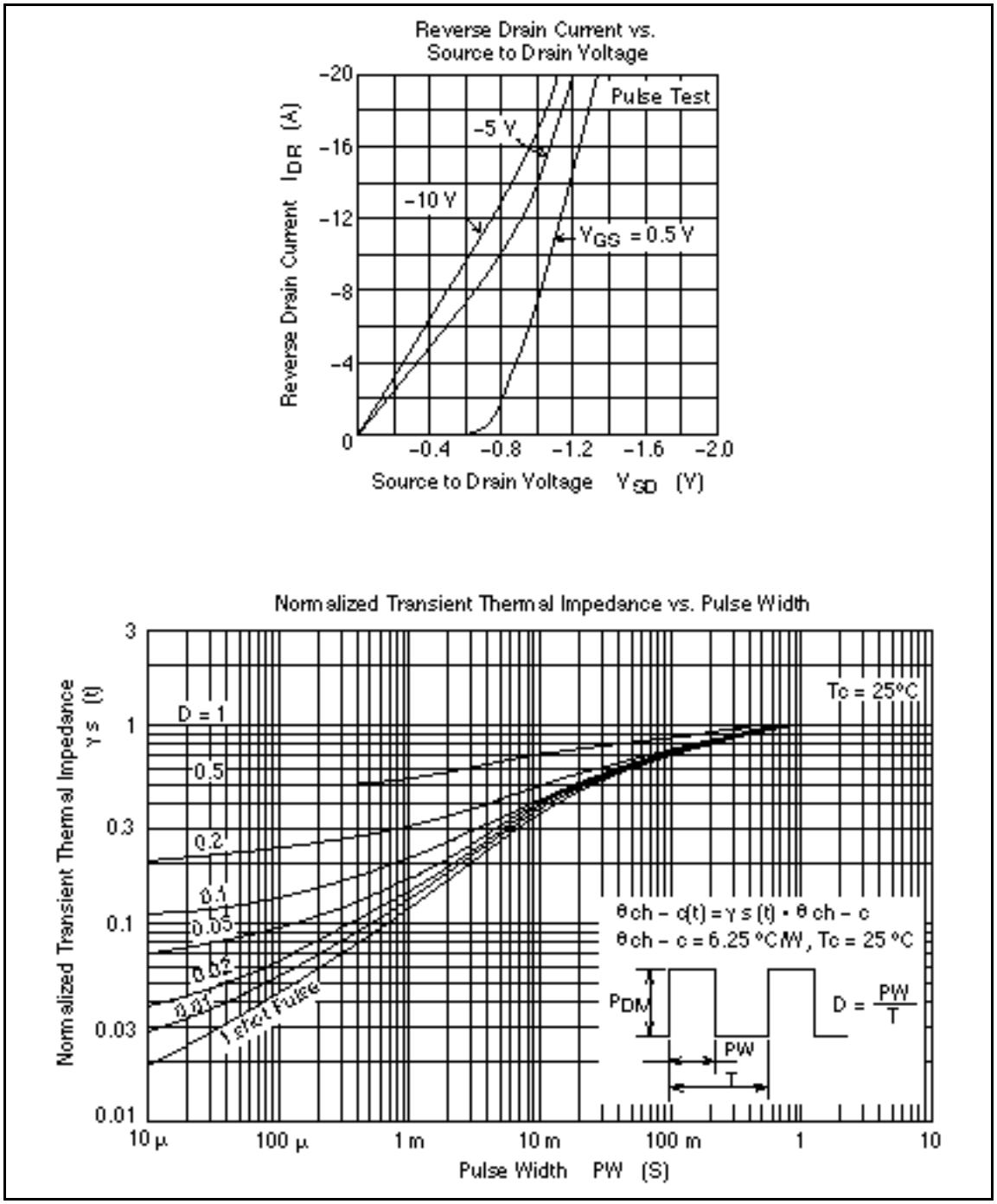
Note: 3. Pulse test

Main Characteristics

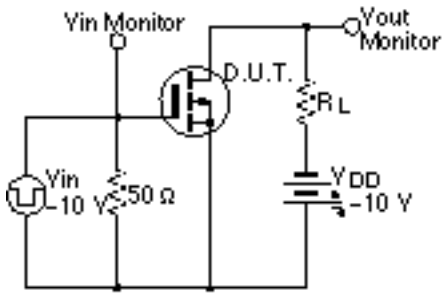



Drain to Source Saturation Voltage vs. Gate to Source Voltage
Drain to Source Saturation Voltage $V_{DS(on)}$ (V)
Pulse Test
I_D = −10 A
−5 A
−2 A
Gate to Source Voltage V_{GS} (V)
Static Drain to Source on State Resistance vs. Drain Current
Drain to Source On State Resistance $R_{DS(on)}$ (Ω)
V_{GS} = −4 V
−10 V
Pulse Test
Drain Current I_D (A)
Static Drain to Source on State Resistance vs. Temperature
Static Drain to Source on State Resistance $R_{DS(on)}$ (Ω)
Pulse Test
I_D = −10 A
−5 A
−10 A
−2,−5 A
V_{GS} = −4 V
V_{GS} = −10 V
Case Temperature Tc (°C)
Forward Transfer Admittance vs. Drain Current
Forward Transfer Admittance $|y_{fs}|$ (S)
Tc = −25 °C
25 °C
75 °C
V_{DS} = −10 V
Pulse Test
Drain Current I_D (A)

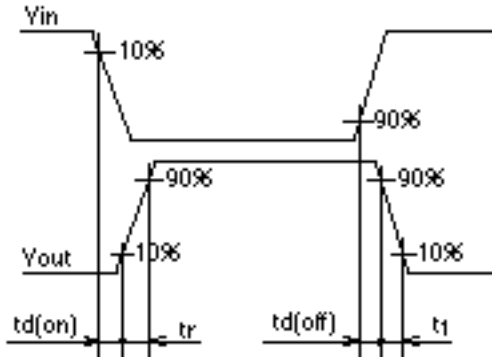

Body to Drain Diode Reverse Recovery Time
Reverse Recovery Time trr (ns)
100
50
20
10
-0.1 -0.2 -0.5 -1 -2 -5 -10 -20
Reverse Drain Current IDR (A)
di / dt = 50 A / µs
VGS = 0, Ta = 25 °C
Typical Capacitance vs. Drain to Source Voltage
Capacitance C (pF)
5000
2000
1000
500
200
100
50
20
10
0 -10 -20 -30 -40 -50
Drain to Source Voltage VDS (V)
VGS = 0
f = 1 MHz
Ciss
Coss
Crss
Dynamic Input Characteristics
Drain to Source Voltage VDS (V)
Gate to Source Voltage VGS (V)
0 -10 -20 -30 -40 -50
0 -4 -8 -12 -16 -20
0 8 16 24 32 40
Gate Charge Qg (nc)
VDD = -5 V
-10 V
-25 V
VDS
VDD = -25 V
-10 V
-5 V
VGS
ID = -10 A
Switching Characteristics
Switching Time t (ns)
1000
500
200
100
50
20
10
5
-0.1 -0.2 -0.5 -1 -2 -5 -10 -20 -50
Drain Current ID (A)
VGS = -10 V, VDD = -10 V
PW = 10 µs, duty < 1 %
td(off)
tf
tr
td(on)


Reverse Drain Current vs.
Source to Drain Voltage
Pulse Test
-5 V
-10 V
VGS = 0.5 V
Reverse Drain Current IDR (A)
Source to Drain Voltage VSD (V)
-20
-16
-12
-8
-4
0
-0.4
-0.8
-1.2
-1.6
-2.0
Normalized Transient Thermal Impedance vs. Pulse Width
Normalized Transient Thermal Impedance γs (t)
Tc = 25°C
D = 1
0.5
0.2
0.1
0.05
0.02
0.01
1 shot Pulse
θch – c(t) = γs (t) • θch – c
θch – c = 6.25 °C/W, Tc = 25 °C
PDM
D = PW/T
PW
T
3
1
0.3
0.1
0.03
0.01
10 µ
100 µ
1 m
10 m
100 m
1
10
Pulse Width PW (S)

Switching Time Test Circuit

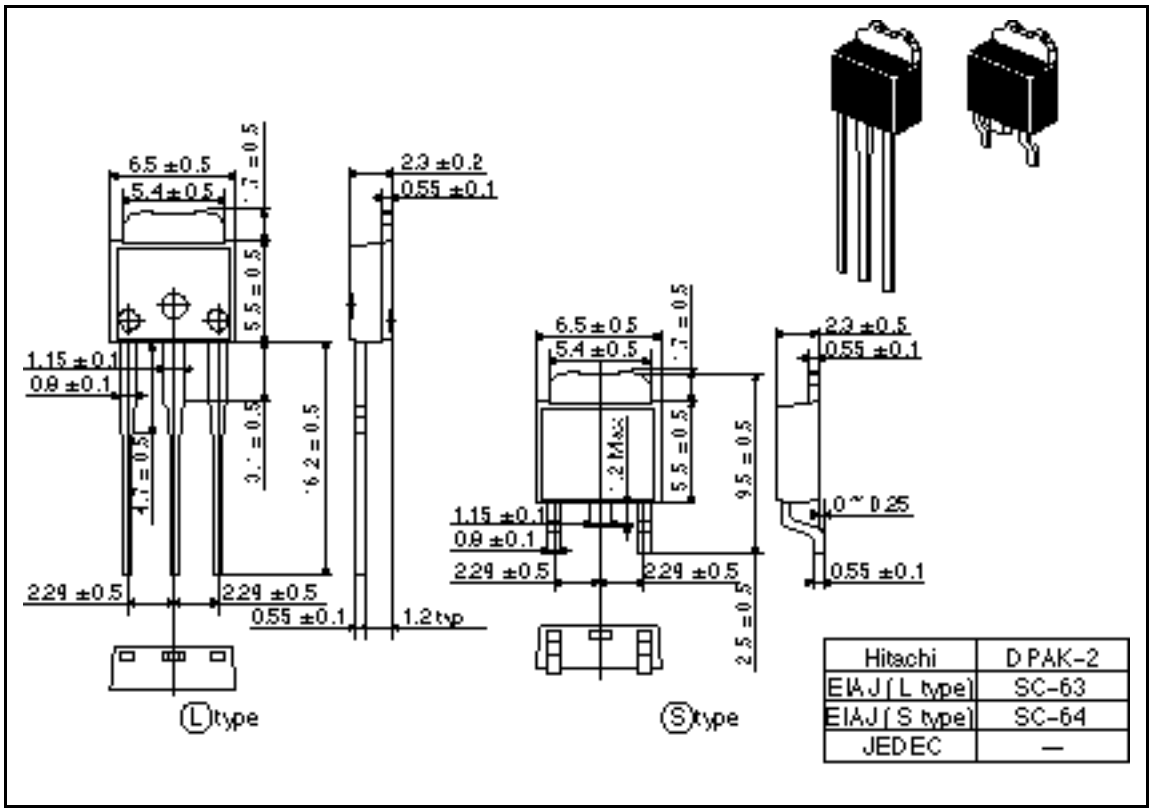


Waveforms



Package Dimensions

Unit: mm



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