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

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6AM11

Silicon N-Channel/P-Channel Power MOS FET Array



ADE-208-1215 (Z)
1st. Edition
Mar. 2001

Application

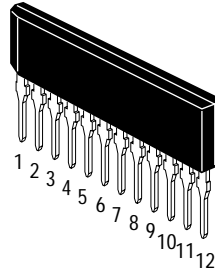
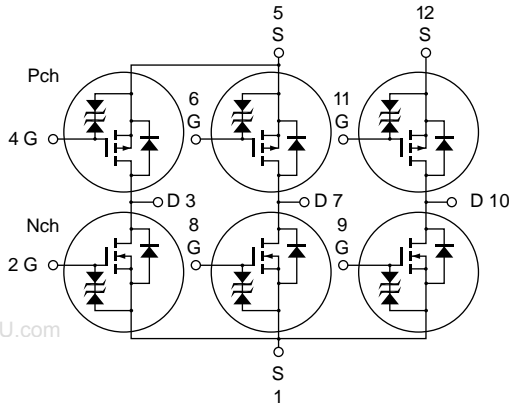
High speed power switching

Features

- Low on-resistance
N-channel: $R_{DS(on)} \leq 0.17$, $V_{GS} = 10$ V, $I_D = 2.5$ A
P-channel: $R_{DS(on)} \leq 0.2$, $V_{GS} = -10$ V, $I_D = -2.5$ A
- Capable of 4 V gate drive
- Low drive current
- High speed switching
- High density mounting
- Suitable for H-bridged motor driver

Outline

SP-12



- 1. N-ch Source
- 2, 8, 9 N-ch Gate
- 3, 7, 10. N-ch Drain
P-ch Drain
- 4, 6, 11. P-ch Gate
- 5, 12. P-ch Source

Absolute Maximum Ratings (Ta = 25°C) (1 Unit)

Item	Symbol	Ratings		
		Nch	Pch	Unit
Drain to source voltage	V_{DSS}	60	-60	V
Gate to source voltage	V_{GSS}	±20	±20	V
Drain current	I_D	5	-5	A
Drain peak current	$I_{D(pulse)}^{*1}$	20	-20	A
Body to drain diode reverse drain current	I_{DR}	5	-5	A
Channel dissipation	$Pch (Tc = 25°C)^{*2}$	36		W
	Pch^{*2}	4.8		W
Channel temperature	Tch	150		°C
Storage temperature	Tstg	-55 to +150		°C

Notes: 1. $PW \leq 10 \mu s$, duty cycle $\leq 1\%$

2. 6 Device Operation

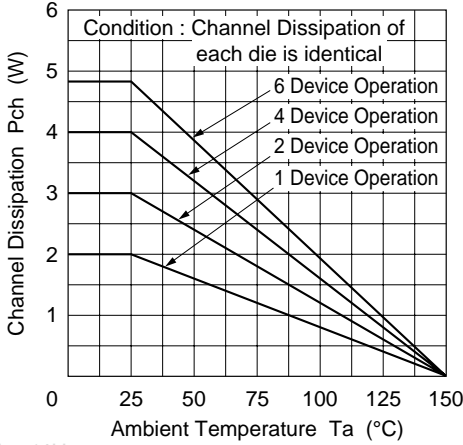
Electrical Characteristics (Ta = 25°C) (1 Unit)

Item	Symbol	N channel			P channel			Unit	Test conditions
		Min	Typ	Max	Min	Typ	Max		
Drain to source breakdown voltage	$V_{(BR)DSS}$	60	—	—	-60	—	—	V	$I_D = 10 \text{ mA}, V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	± 20	—	—	± 20	—	—	V	$I_G = \pm 100 \mu\text{A}, V_{DS} = 0$
Gate to source leak current	I_{GSS}	—	—	± 10	—	—	± 10	μA	$V_{GS} = \pm 16 \text{ V}, V_{DS} = 0$
Zero gate voltage drain current	I_{DSS}	—	—	250	—	—	-250	μA	$V_{DS} = 50 \text{ V}, V_{GS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	1.0	—	2.0	-1.0	—	-2.0	V	$I_D = 1 \text{ mA}, V_{DS} = 10 \text{ V}$
Static drain to source on state resistance	$R_{DS(on)}$	—	0.13	0.17	—	0.15	0.2	Ω	$I_D = 2.5 \text{ A}, V_{GS} = 10 \text{ V}^{*1}$
		—	0.18	0.24	—	0.20	0.27	Ω	$I_D = 2.5 \text{ A}, V_{GS} = 4 \text{ V}^{*1}$
Forward transfer admittance	$ y_{fs} $	2.7	4.5	—	2.7	5.0	—	S	$I_D = 2.5 \text{ A}, V_{DS} = 10 \text{ V}^{*1}$
Input capacitance	C_{iss}	—	400	—	—	900	—	pF	$V_{DS} = 10 \text{ V}, V_{GS} = 0,$
Output capacitance	C_{oss}	—	220	—	—	460	—	pF	$f = 1 \text{ MHz}$
Reverse transfer capacitance	C_{rss}	—	60	—	—	130	—	pF	
Turn-on delay time	$t_{d(on)}$	—	5	—	—	8	—	ns	$I_D = 2.5 \text{ A}, V_{GS} = 10 \text{ V},$
Rise time	t_r	—	30	—	—	35	—	ns	$R_L = 12 \Omega$
Turn-off delay time	$t_{d(off)}$	—	170	—	—	180	—	ns	
Fall time	t_f	—	75	—	—	85	—	ns	
Body to drain diode forward voltage	V_{DF}	—	1.0	—	—	-1.0	—	V	$I_F = 5 \text{ A}, V_{GS} = 0$
Body to drain diode reverse recovery time	t_{rr}	—	100	—	—	170	—	ns	$I_F = 5 \text{ A}, V_{GS} = 0,$ $diF/dt = 50 \text{ A}/\mu\text{s}$

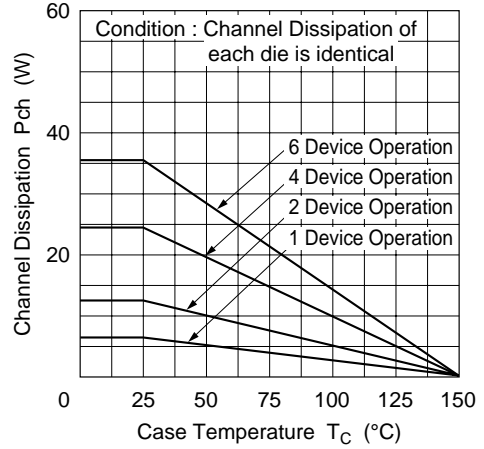
Note: 1. Pulse Test

Polarity of test conditions for P channel device is reversed.

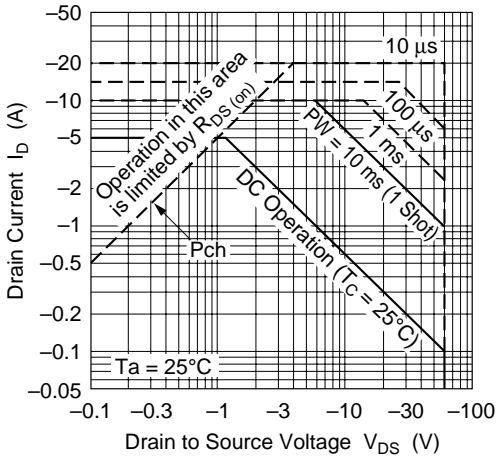
Maximum Channel Dissipation Curve



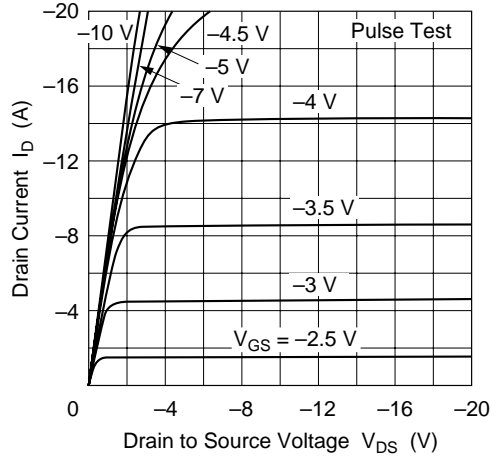
Maximum Channel Dissipation Curve

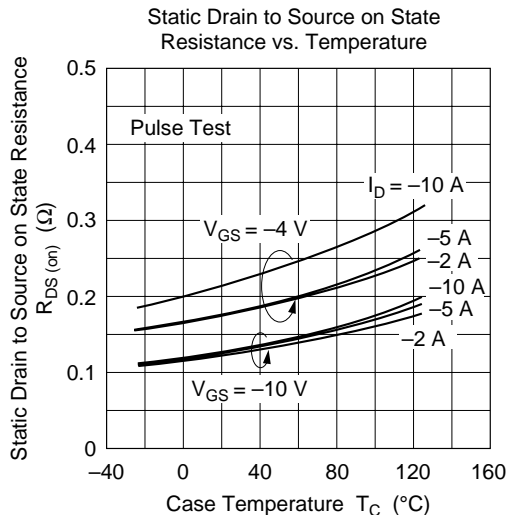
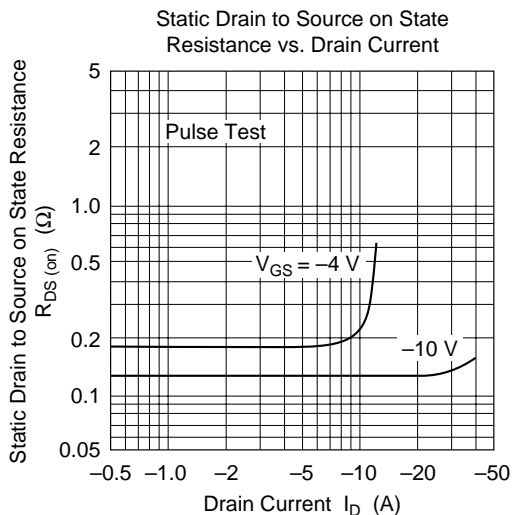
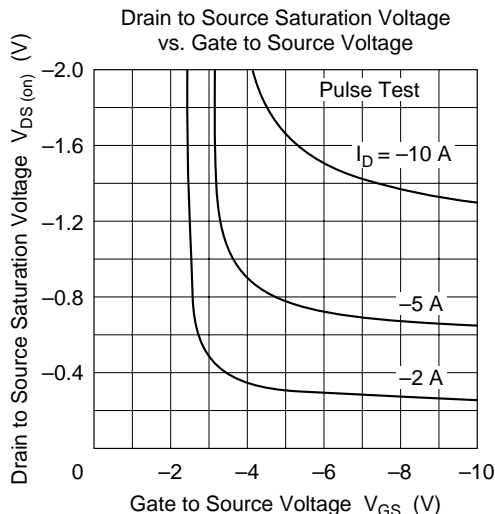
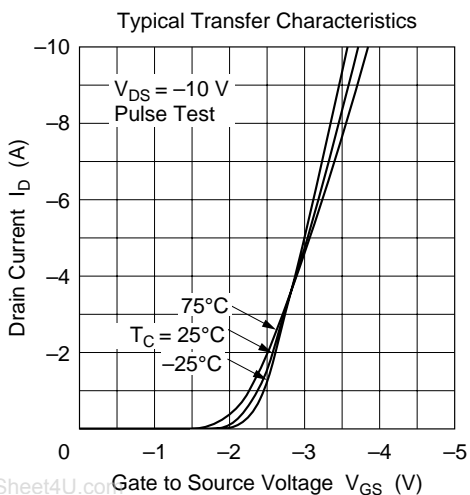


Maximum Safe Operation Area (P-Channel)

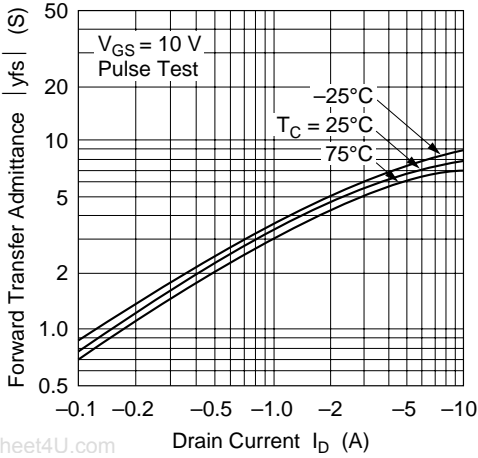


Typical Output Characteristics

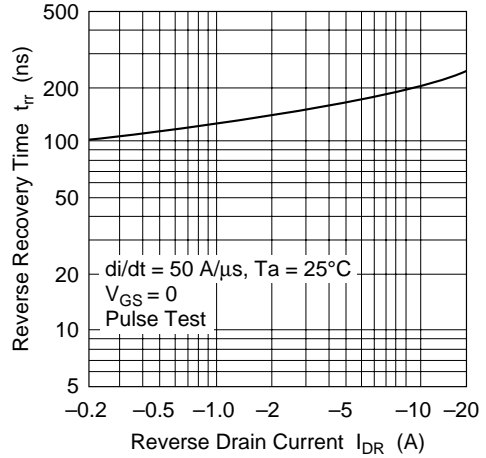




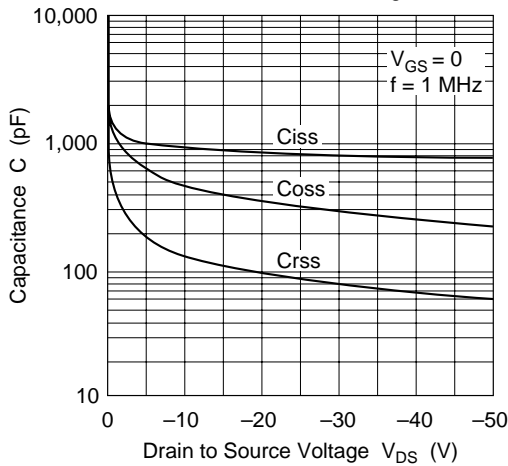
Forward Transfer Admittance vs. Drain Current



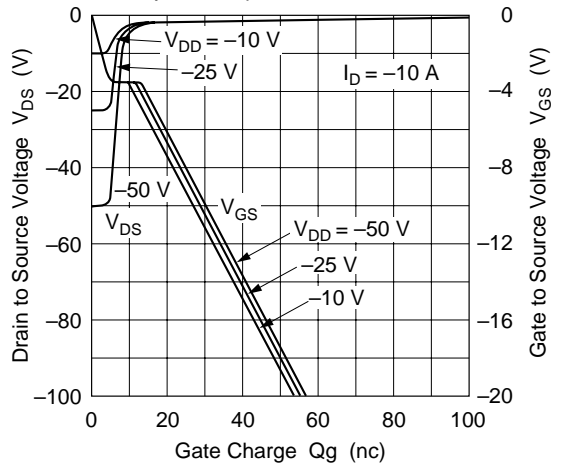
Body to Drain Diode Reverse Recovery Time

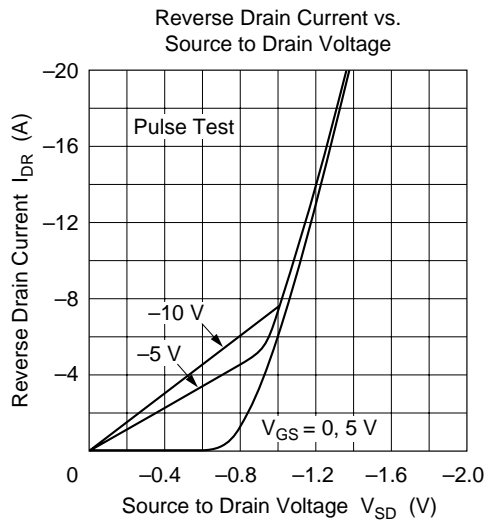
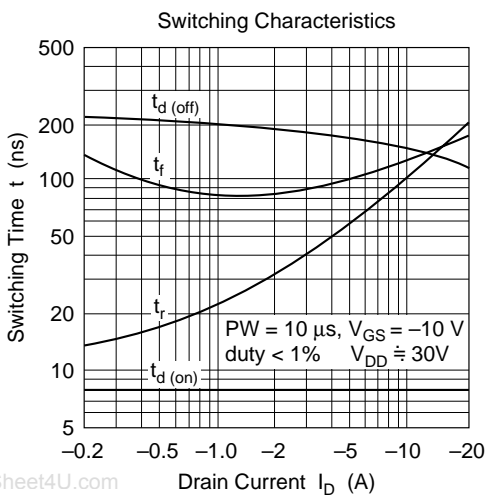


Typical Capacitance vs. Drain to Source Voltage



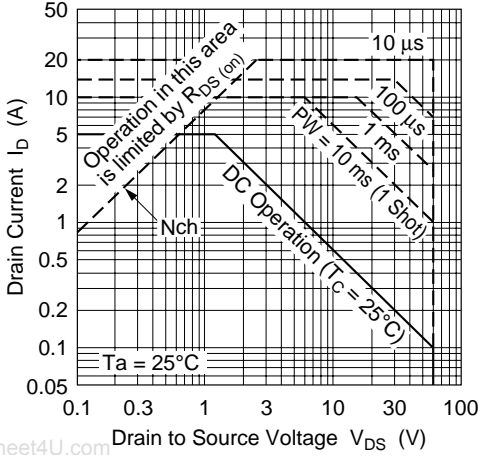
Dynamic Input Characteristics



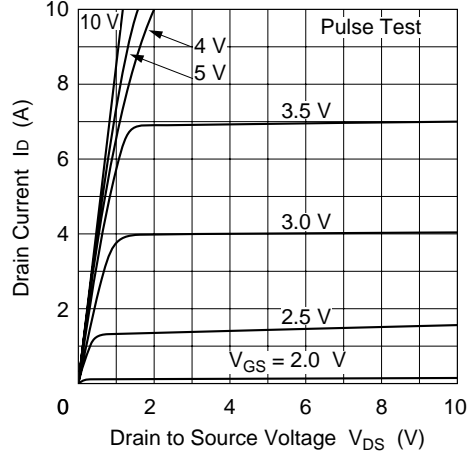


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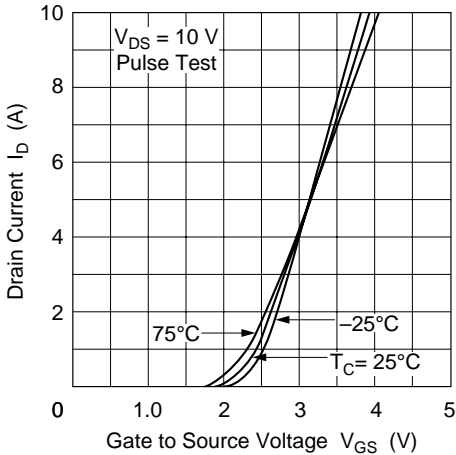
Maximum Safe Operation Area
(N-Channel)



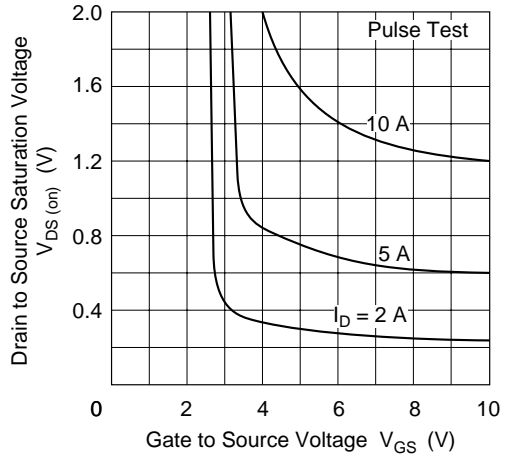
Typical Output Characteristics

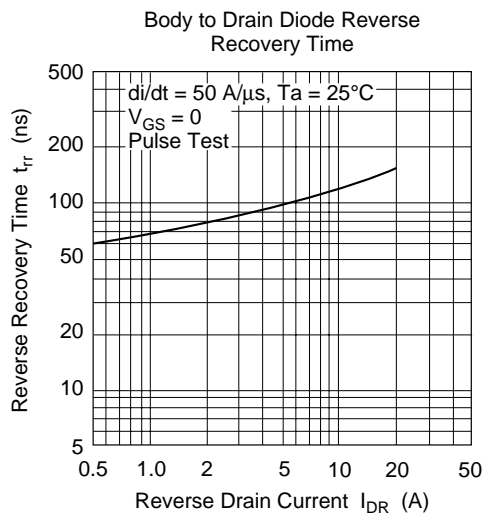
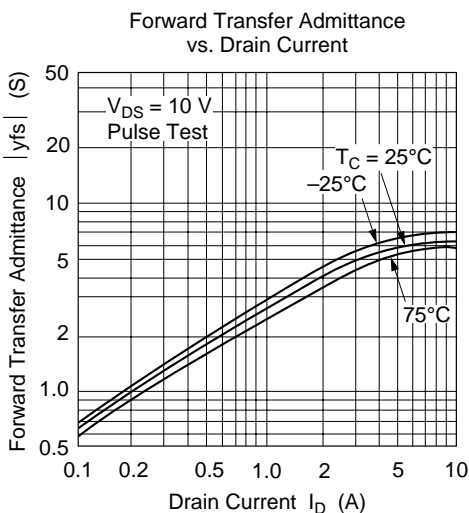
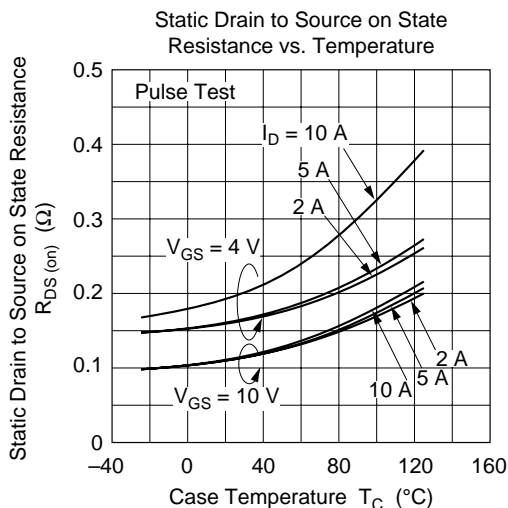
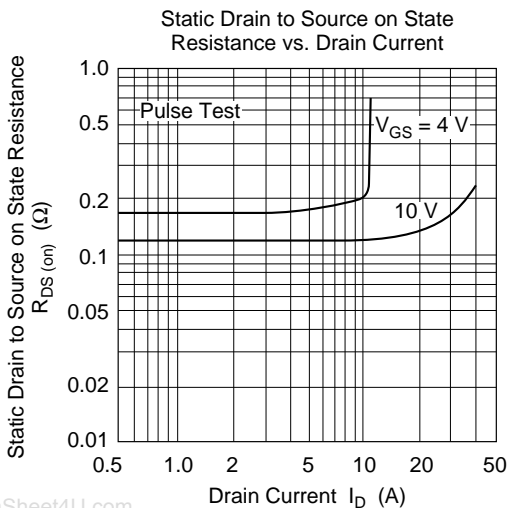


Typical Transfer Characteristics



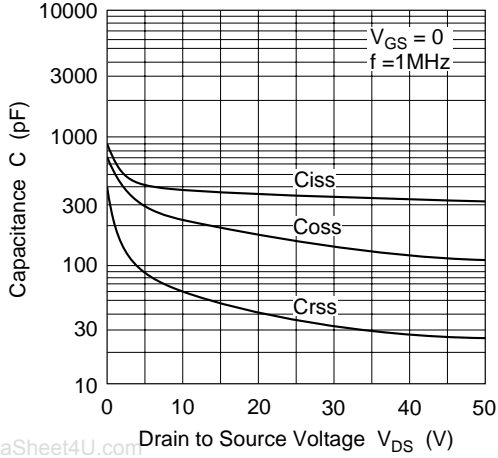
Drain to Source Saturation Voltage vs. Gate to Source Voltage



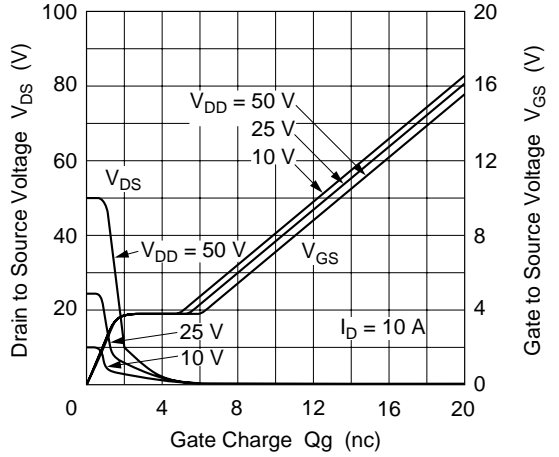


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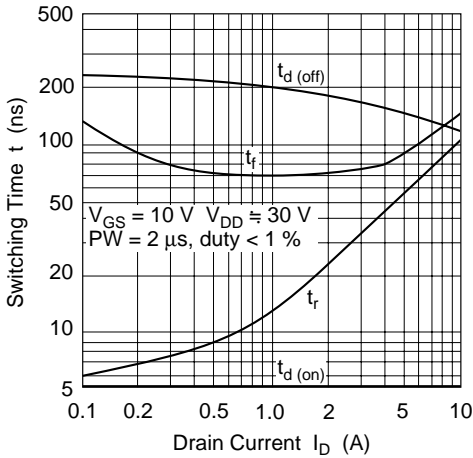
Typical Capacitance vs. Drain to Source Voltage



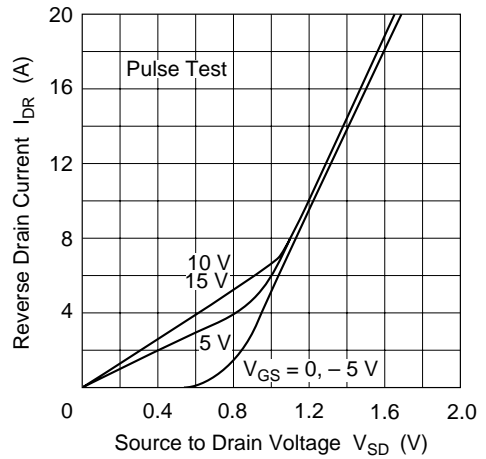
Dynamic Input Characteristics



Switching Characteristics



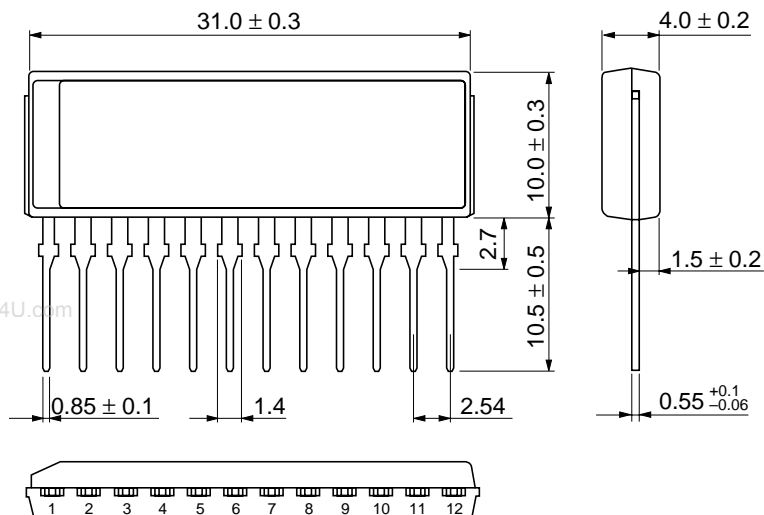
Reverse Drain Current vs. Source to Drain Voltage



Package Dimensions

As of January, 2001

Unit: mm



Hitachi Code	SP-12
JEDEC	—
EIAJ	—
Mass (reference value)	3.6 g

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