

4AM16

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

HITACHI

ADE-208-1214 (Z)

1st. Edition

Mar. 2001

Application

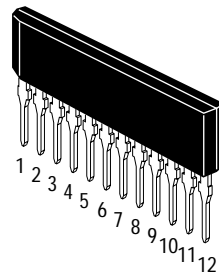
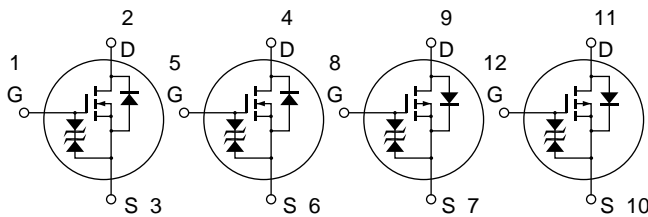
High speed power switching

Features

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

Outline

SP-12



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

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Absolute Maximum Ratings (Ta = 25°C)

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	8	-8	A
Drain peak current	$I_{D(pulse)}^{*1}$	32	-32	A
Body to drain diode reverse drain current	I_{DR}	8	-8	A
Channel dissipation	$Pch (Tc = 25°C)^{*2}$	28		W
	Pch^{*2}	4.0		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. 4 Device Operation

Electrical Characteristics (Ta = 25°C)

Item	Symbol	N channel			Unit	Test conditions
		Min	Typ	Max		
Drain to source breakdown voltage	$V_{(BR)DSS}$	60	—	—	V	$I_D = 10 \text{ mA}, V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	± 20	—	—	V	$I_G = \pm 100 \text{ }\mu\text{A}, V_{DS} = 0$
Gate to source leak current	I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 16 \text{ V}, V_{DS} = 0$
Zero gate voltage drain current	I_{DSS}	—	—	-250	μA	$V_{DS} = 50 \text{ V}, V_{GS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	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	Ω	$I_D = 4 \text{ A}, V_{GS} = 10 \text{ V}^{*1}$
		—	0.18	0.24	Ω	$I_D = 4 \text{ A}, V_{GS} = 4 \text{ V}^{*1}$
Forward transfer admittance	$ y_{fs} $	3.5	5.5	—	S	$I_D = 4 \text{ A}$ $V_{DS} = 10 \text{ V}^{*1}$
Input capacitance	C_{iss}	—	400	—	pF	$V_{DS} = 10 \text{ V}$
Output capacitance	C_{oss}	—	220	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	C_{rss}	—	60	—	pF	$f = 1 \text{ MHz}$
Turn-on delay time	$t_{d(on)}$	—	5	—	ns	$I_D = 4 \text{ A}$
Rise time	t_r	—	45	—	ns	$V_{GS} = 10 \text{ V}$
Turn-off delay time	$t_{d(off)}$	—	150	—	ns	$R_L = 7.5 \text{ }\Omega$
Fall time	t_f	—	85	—	ns	
Body to drain diode forward voltage	V_{DF}	—	1.2	—	V	$I_F = 8 \text{ A}, V_{GS} = 0$
Body to drain diode reverse recovery time	t_{rr}	—	120	—	ns	$I_F = 8 \text{ A}, V_{GS} = 0,$ $diF/dt = 50 \text{ A}/\mu\text{s}$

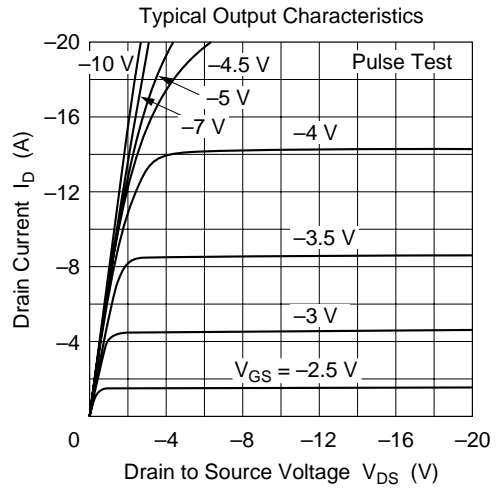
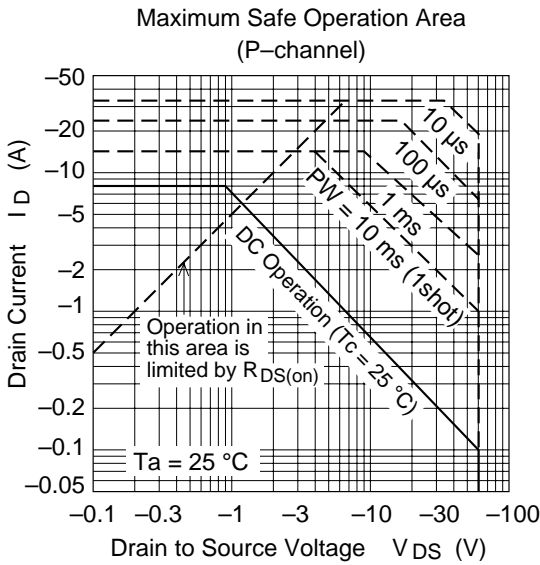
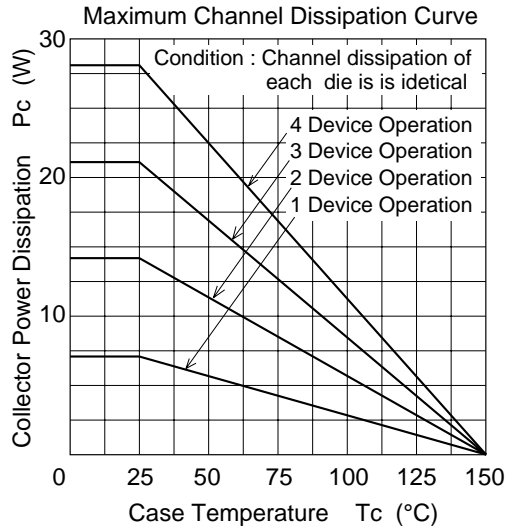
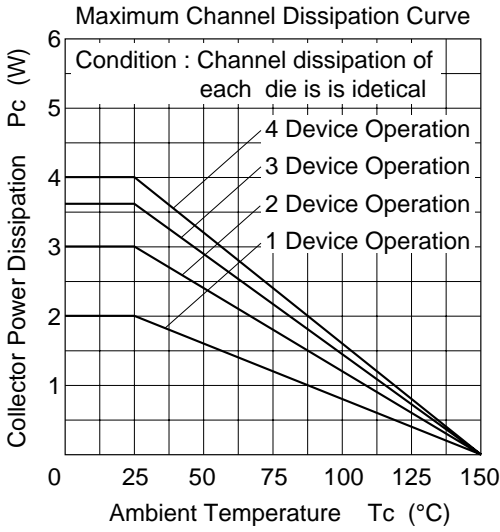
Note: 1. Pulse Test

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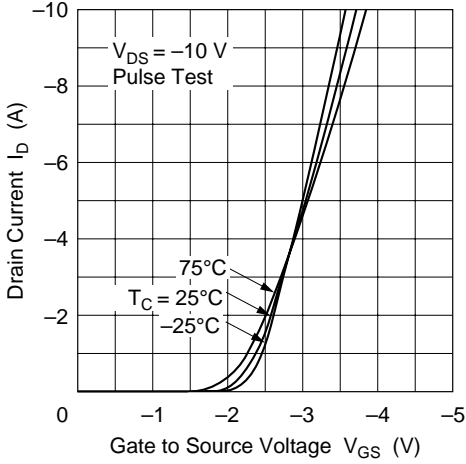
Electrical Characteristics (Ta = 25°C)

Item	Symbol	P channel			Unit	Test conditions
		Min	Typ	Max		
Drain to source breakdown voltage	$V_{(BR)DSS}$	-60	—	—	V	$I_D = -10 \text{ mA}, V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	± 20	—	—	V	$I_G = \pm 100 \text{ }\mu\text{A}, V_{DS} = 0$
Gate to source leak current	I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 16 \text{ V}, V_{DS} = 0$
Zero gate voltage drain current	I_{DSS}	—	—	-250	μA	$V_{DS} = -50 \text{ V}, V_{GS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	-1.0	—	-2.0	V	$I_D = -1 \text{ mA}, V_{DS} = -10 \text{ V}$
Static drain to source on state resistance	$R_{DS(on)}$	—	0.15	0.20	Ω	$I_D = -4 \text{ A}, V_{GS} = -10 \text{ V}^{*1}$
		—	0.20	0.27	Ω	$I_D = -4 \text{ A}, V_{GS} = -4 \text{ V}^{*1}$
Forward transfer admittance	$ y_{fs} $	3.5	6.0	—	S	$I_D = -4 \text{ A}$ $V_{DS} = -10 \text{ V}^{*1}$
Input capacitance	C_{iss}	—	900	—	pF	$V_{DS} = -10 \text{ V}$
Output capacitance	C_{oss}	—	460	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	C_{rss}	—	130	—	pF	$f = 1 \text{ MHz}$
Turn-on delay time	$t_{d(on)}$	—	8	—	ns	$I_D = -4 \text{ A}$
Rise time	t_r	—	50	—	ns	$V_{GS} = -10 \text{ V}$
Turn-off delay time	$t_{d(off)}$	—	180	—	ns	$R_L = 7.5 \text{ }\Omega$
Fall time	t_f	—	95	—	ns	
Body to drain diode forward voltage	V_{DF}	—	-1.2	—	V	$I_F = -8 \text{ A}, V_{GS} = 0$
Body to drain diode reverse recovery time	t_{rr}	—	185	—	ns	$I_F = -8 \text{ A}, V_{GS} = 0,$ $diF/dt = 50 \text{ A}/\mu\text{s}$

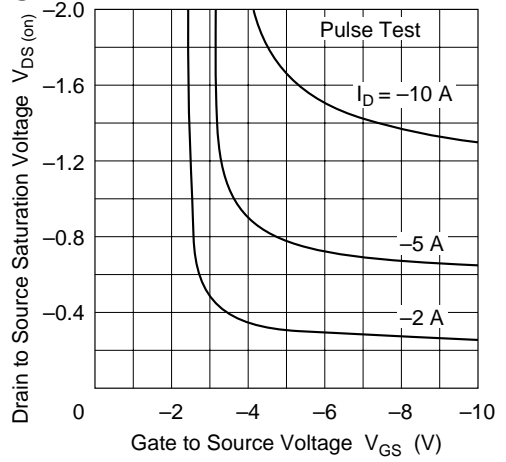
Note: 1. Pulse Test



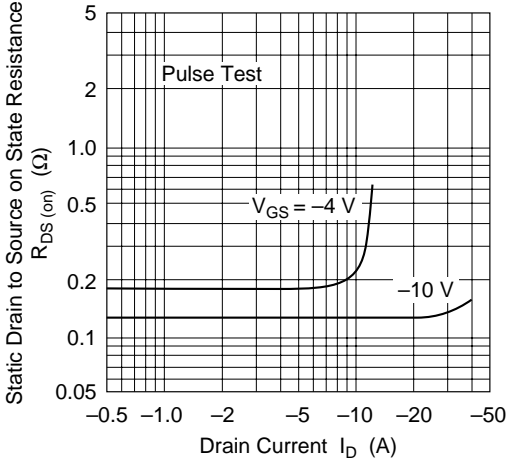
Typical Transfer Characteristics



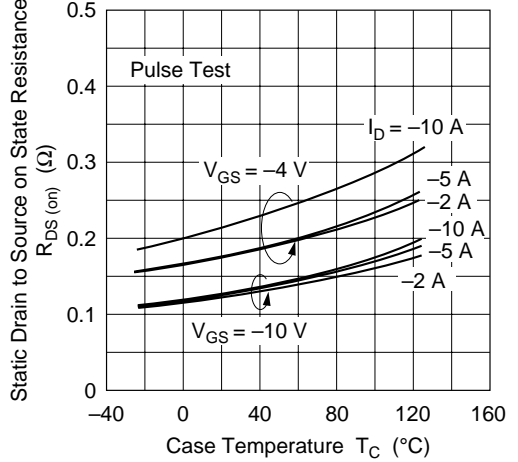
Drain to Source Saturation Voltage vs. Gate to Source Voltage



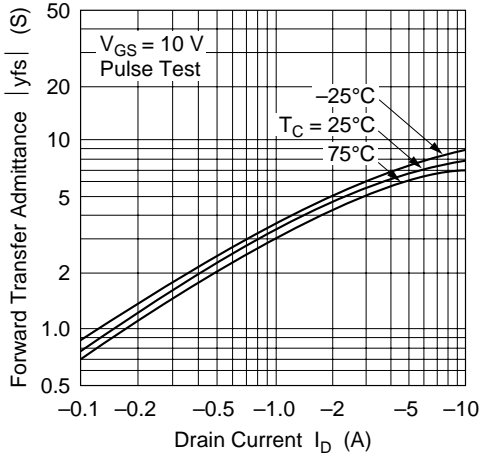
Static Drain to Source on State Resistance vs. Drain Current



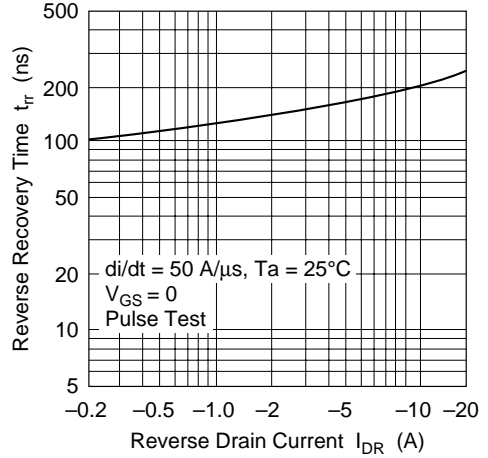
Static Drain to Source on State Resistance vs. Temperature



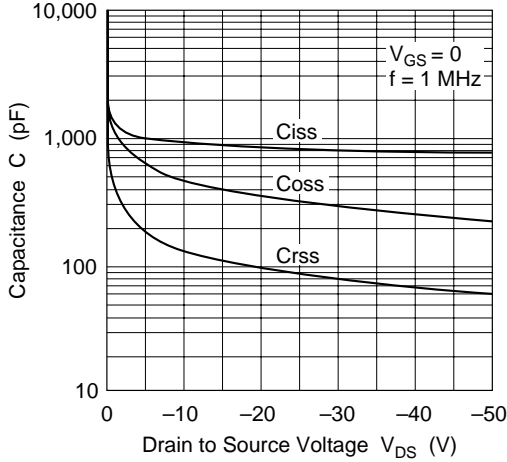
Forward Transfer Admittance vs. Drain Current



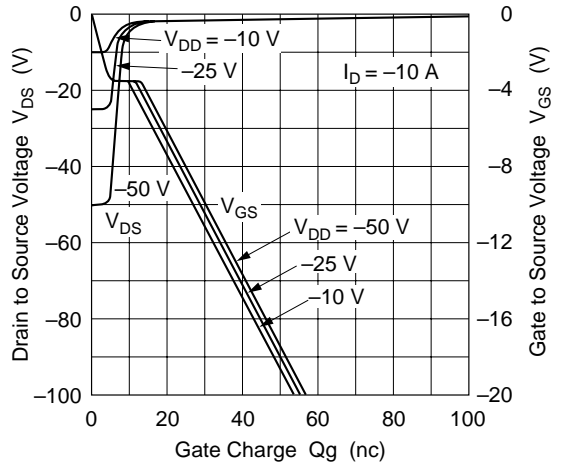
Body to Drain Diode Reverse Recovery Time

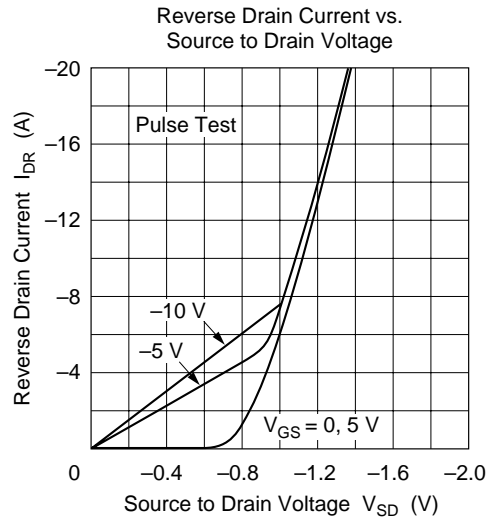
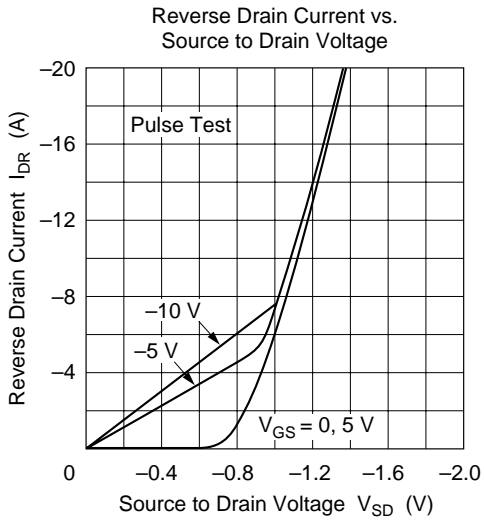


Typical Capacitance vs. Drain to Source Voltage

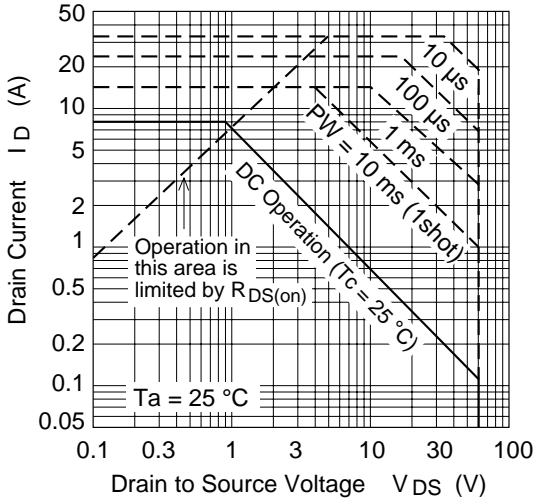


Dynamic Input Characteristics

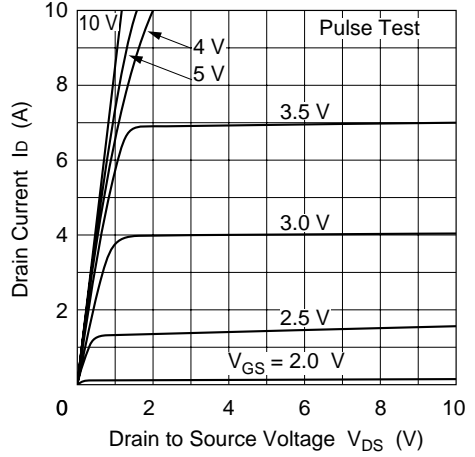




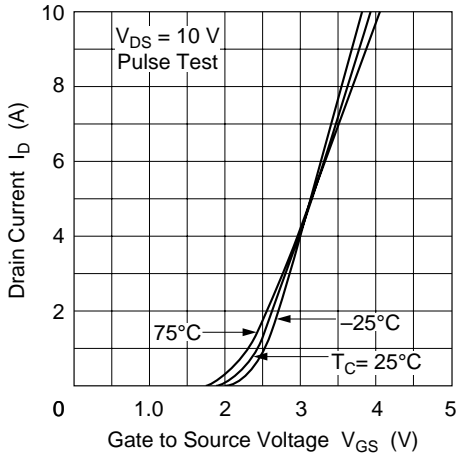
Maximum Safe Operation Area
(N-channel)



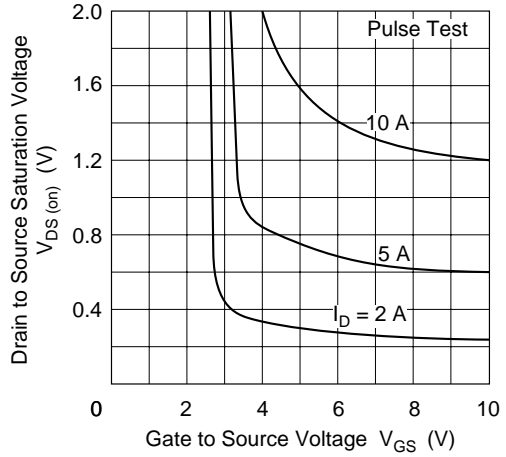
Typical Output Characteristics

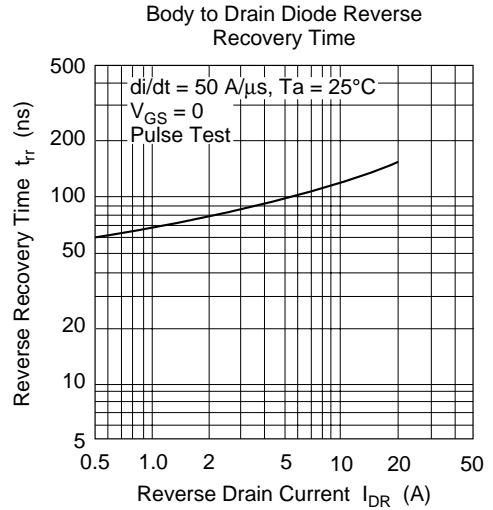
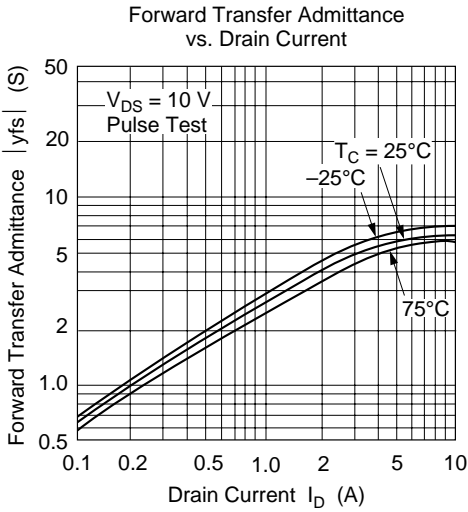
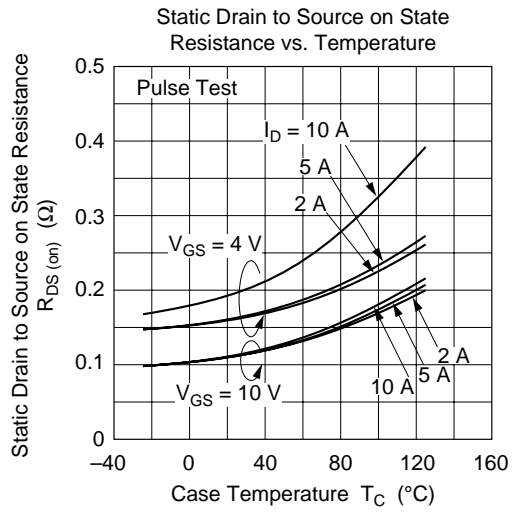
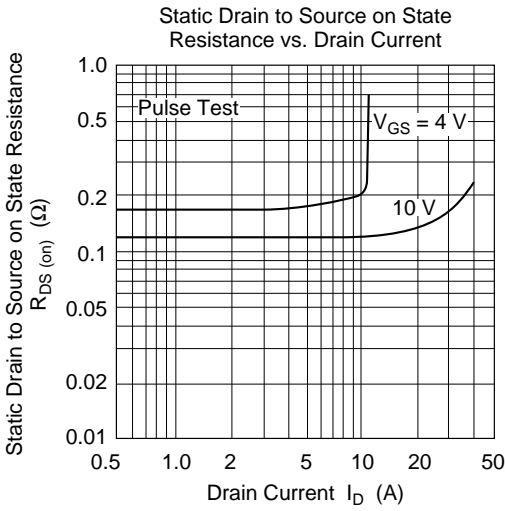


Typical Transfer Characteristics

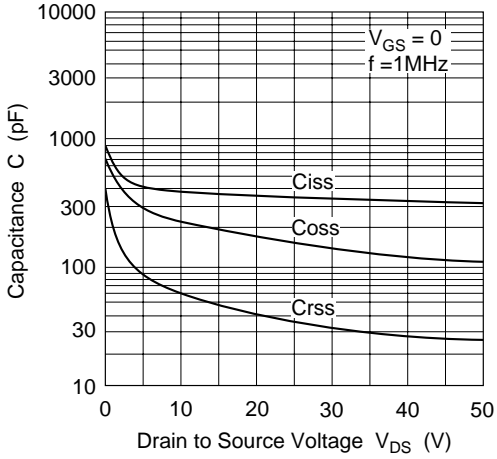


Drain to Source Saturation Voltage
vs. Gate to Source Voltage

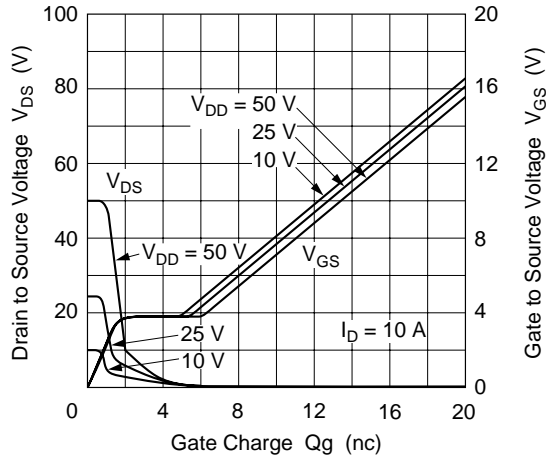




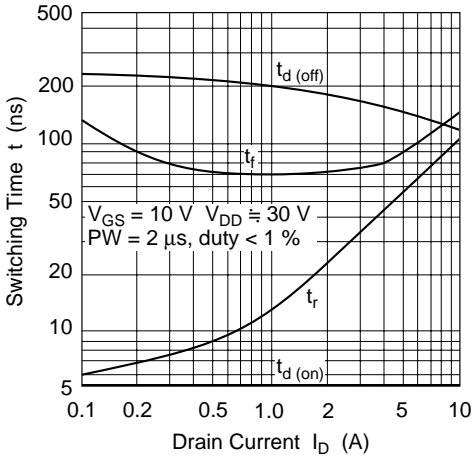
Typical Capacitance vs. Drain to Source Voltage



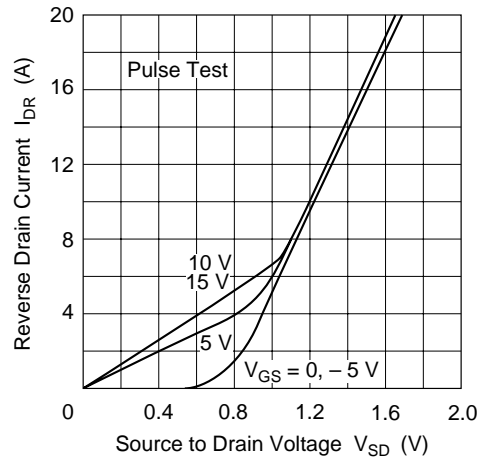
Dynamic Input Characteristics



Switching Characteristics

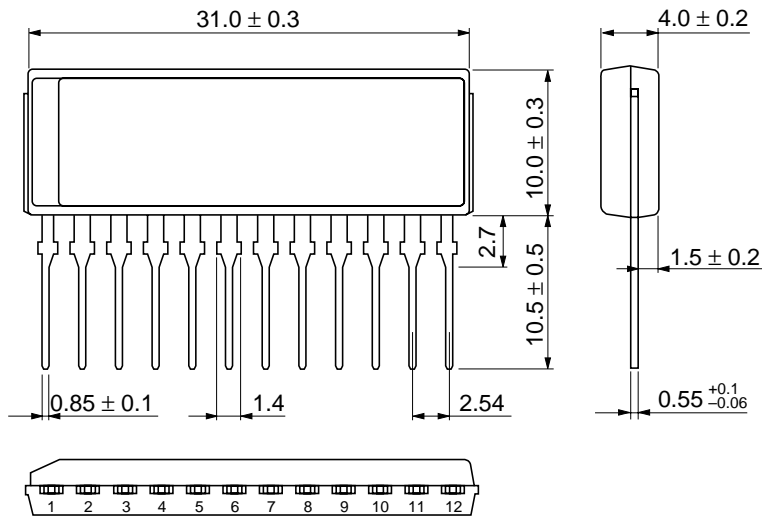


Reverse Drain Current vs. Source to Drain Voltage



Package Dimensions

As of January, 2001
Unit: mm



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

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