

To all our customers

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

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# 4AM14

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



ADE-208-1212 (Z)  
1st. Edition  
Mar. 2001

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### Application

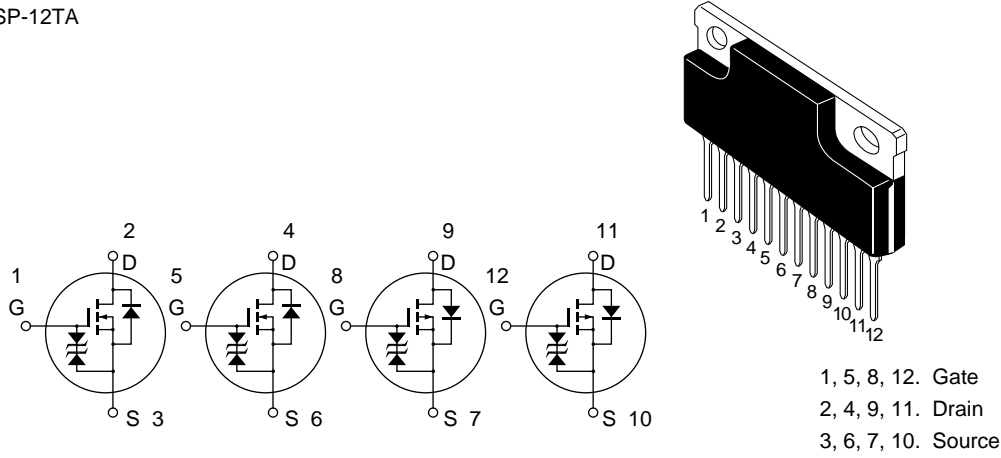
High speed power switching

### 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
- Capable of 4 V gate drive
- Low drive current
- High speed switching
- High density mounting
- Suitable for H-bridged motor driver

Outline

SP-12TA



Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings		Unit
		Nch	Pch	
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	$Pch (Tc = 25^{\circ}C)^{*2}$	32		W
Channel dissipation	$Pch^{*2}$	4		W
Channel temperature	Tch	150		°C
Storage temperature	Tstg	-55 to +150		°C

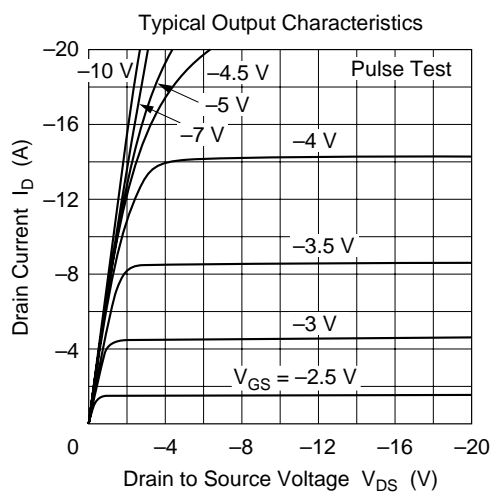
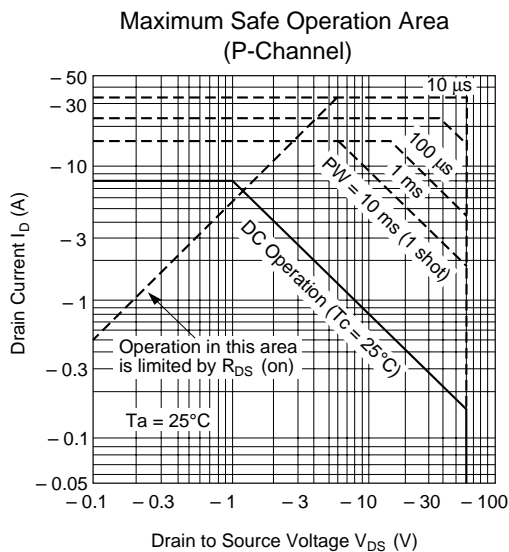
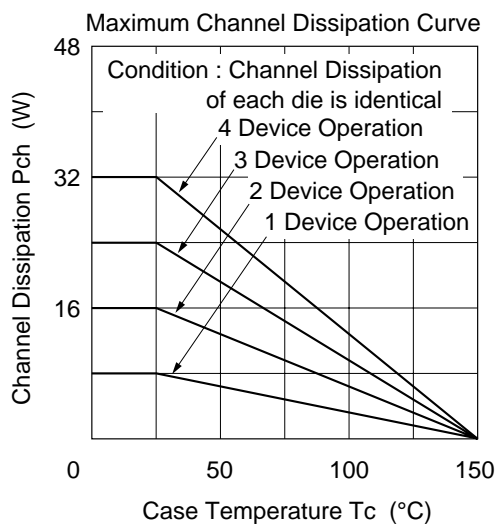
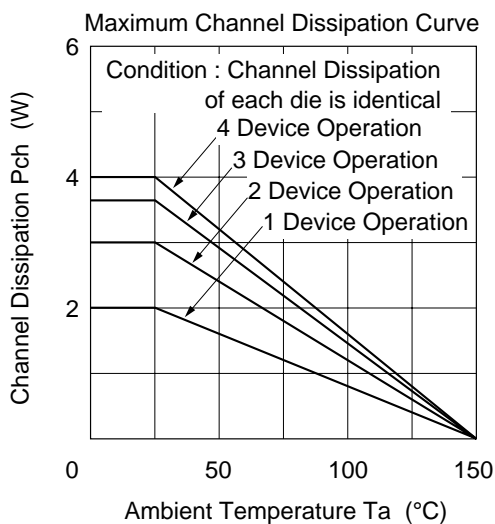
Notes: 1.  $PW \leq 10 \mu s$ , duty cycle  $\leq 1\%$   
2. 4 devices operation

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

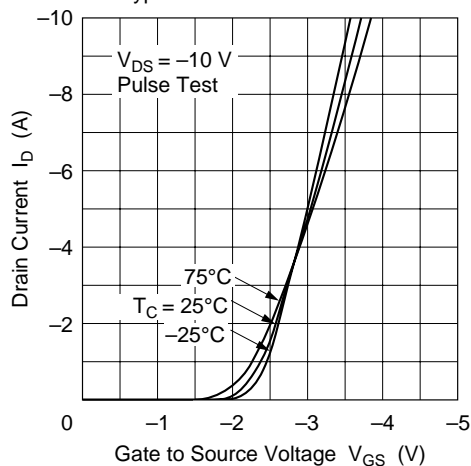
Item	Symbol	N channel			P channel			Unit	Test conditions
		Min	Typ	Max	Min	Typ	Max		
Drain to source breakdown voltage	$V_{(BR)DSS}$	60	—	—	−60	—	—	V	$I_D = 10 \text{ mA}$ , $V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	±20	—	—	±20	—	—	V	$I_G = \pm 100 \text{ } \mu\text{A}$ , $V_{DS} = 0$
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	$I_D = 4 \text{ A}$ , $V_{GS} = 10 \text{ V}^{*1}$
		—	0.18	0.24	—	0.20	0.27	Ω	$I_D = 4 \text{ A}$ , $V_{GS} = 4 \text{ V}^{*1}$
Forward transfer admittance	$ y_{fs} $	3.5	5.5	—	3.5	6.0	—	S	$I_D = 4 \text{ A}$ , $V_{DS} = 10 \text{ V}^{*1}$
Input capacitance	$C_{iss}$	—	400	—	—	900	—	pF	$V_{DS} = 10 \text{ V}$ , $V_{GS} = 0$ , $f = 1 \text{ MHz}$
Output capacitance	$C_{oss}$	—	220	—	—	460	—	pF	
Reverse transfer capacitance	$C_{rss}$	—	60	—	—	130	—	pF	
Turn-on delay time	$t_{d(on)}$	—	5	—	—	8	—	ns	$I_D = 4 \text{ A}$ , $V_{GS} = 10 \text{ V}$ , $R_L = 7.5 \text{ } \Omega$
Rise time	$t_r$	—	45	—	—	50	—	ns	
Turn-off delay time	$t_{d(off)}$	—	150	—	—	180	—	ns	
Fall time	$t_f$	—	85	—	—	95	—	ns	
Body to drain diode forward voltage	$V_{DF}$	—	1.2	—	—	−1.2	—	V	$I_F = 8 \text{ A}$ , $V_{GS} = 0$
Body to drain diode reverse recovery time	$t_{rr}$	—	120	—	—	185	—	ns	$I_F = 8 \text{ A}$ , $V_{GS} = 0$ , $dI_F/dt = 50 \text{ A}/\mu\text{s}$

Note: 1. Pulse Test

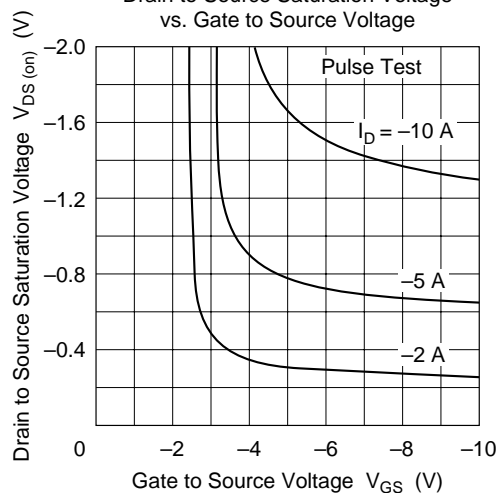
Polarity of test conditions for P channel device is reversed.



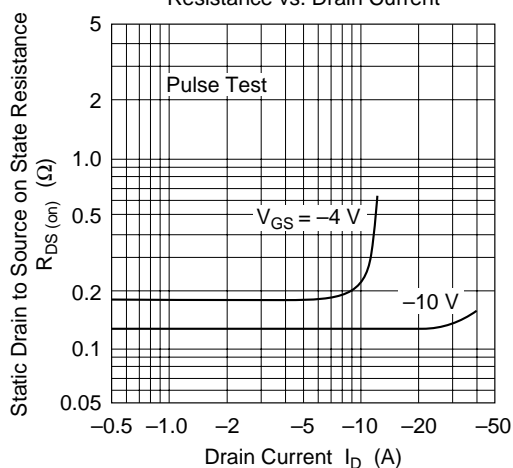
Typical Transfer Characteristics



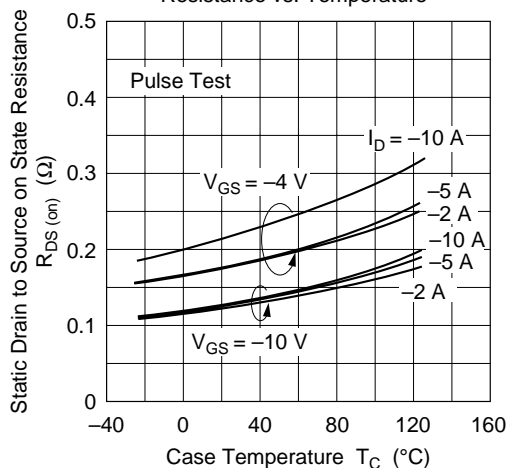
Drain to Source Saturation Voltage vs. Gate to Source Voltage



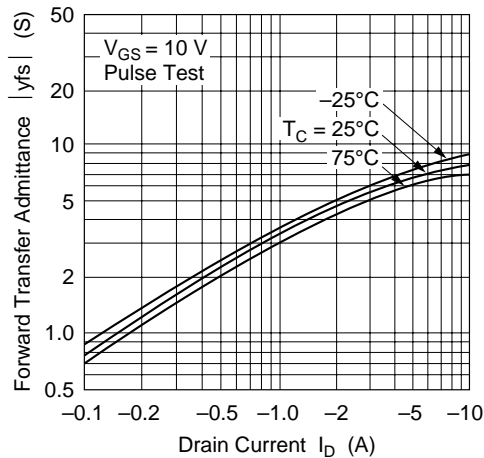
Static Drain to Source on State Resistance vs. Drain Current



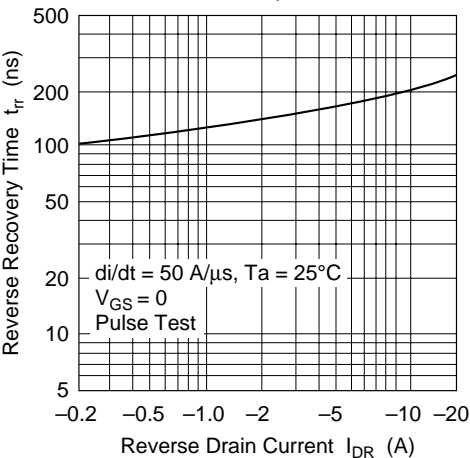
Static Drain to Source on State Resistance vs. Temperature



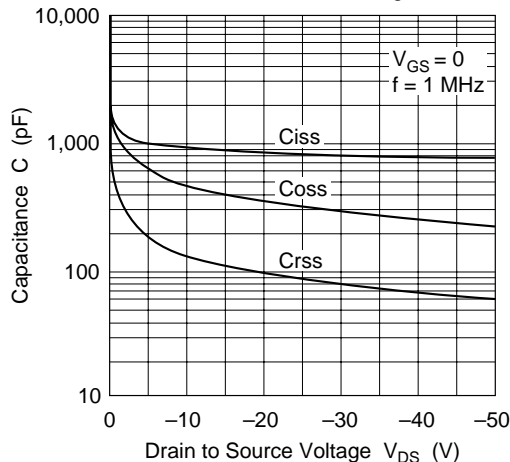
Forward Transfer Admittance  
vs. Drain Current



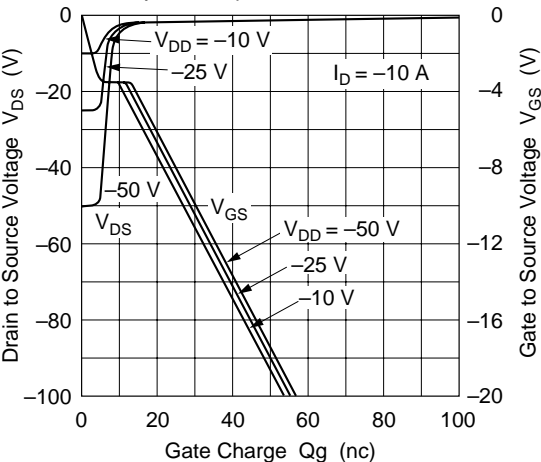
Body to Drain Diode Reverse  
Recovery Time



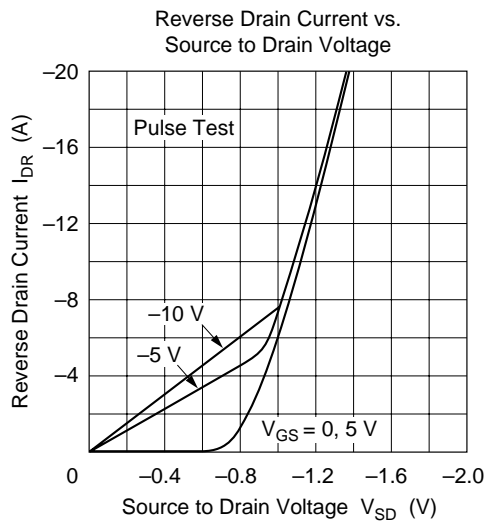
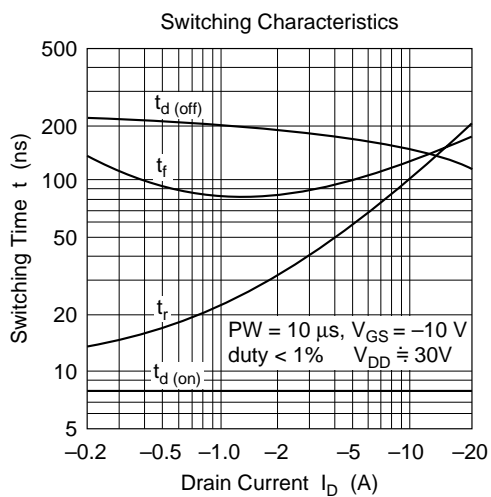
Typical Capacitance vs.  
Drain to Source Voltage



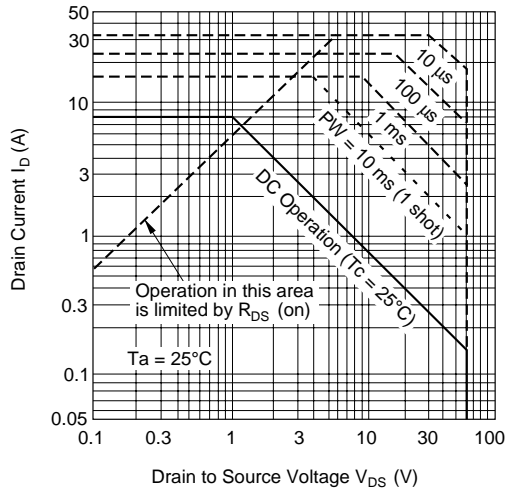
Dynamic Input Characteristics



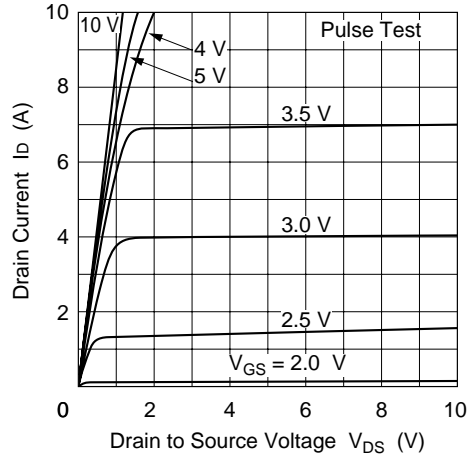




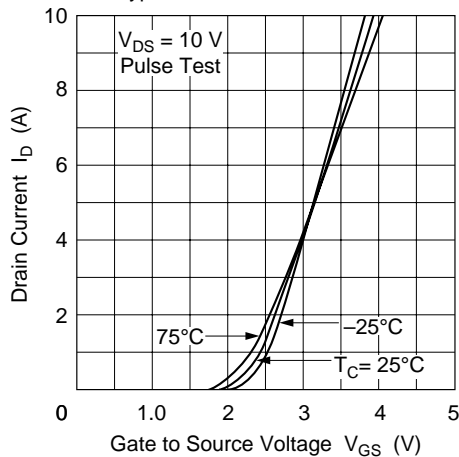
Maximum Safe Operation Area  
(N-Channel)



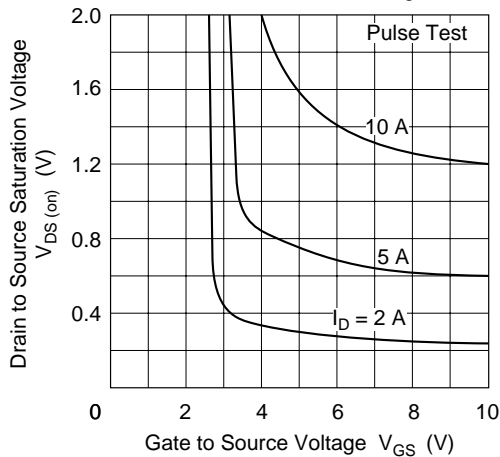
Typical Output Characteristics



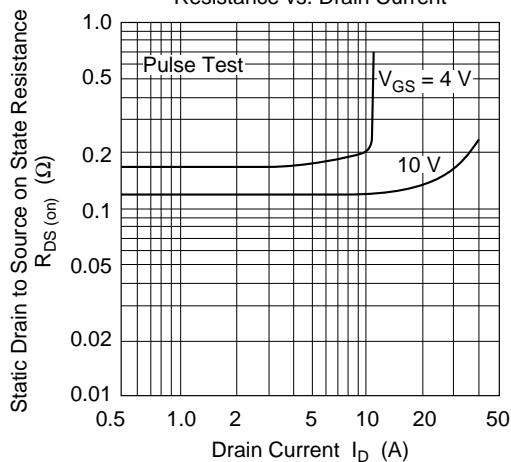
Typical Transfer Characteristics



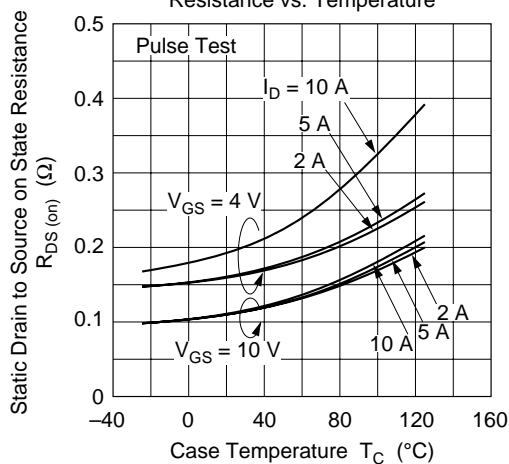
Drain to Source Saturation Voltage  
vs. Gate to Source Voltage



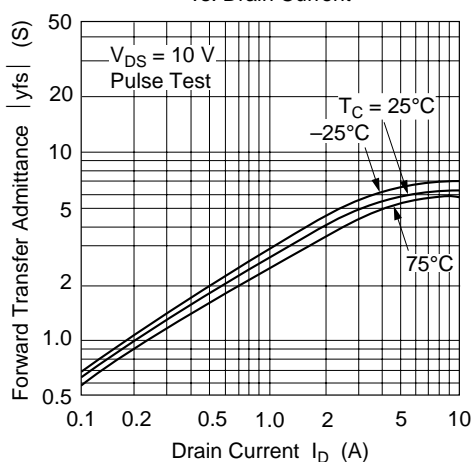
Static Drain to Source on State  
Resistance vs. Drain Current



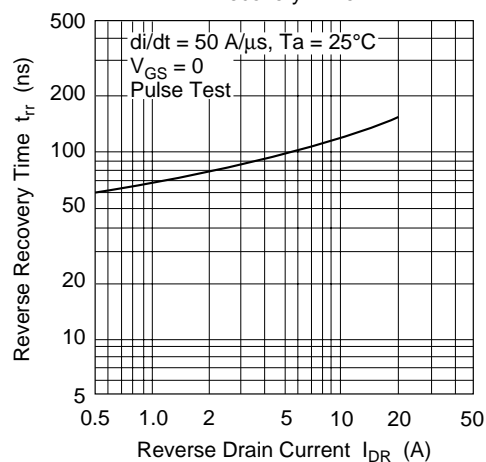
Static Drain to Source on State  
Resistance vs. Temperature



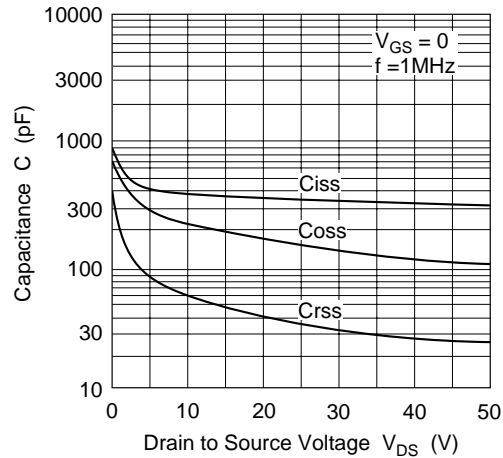
Forward Transfer Admittance  
vs. Drain Current



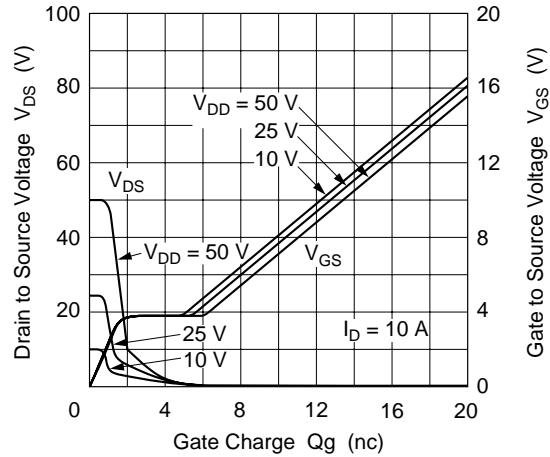
Body to Drain Diode Reverse  
Recovery Time



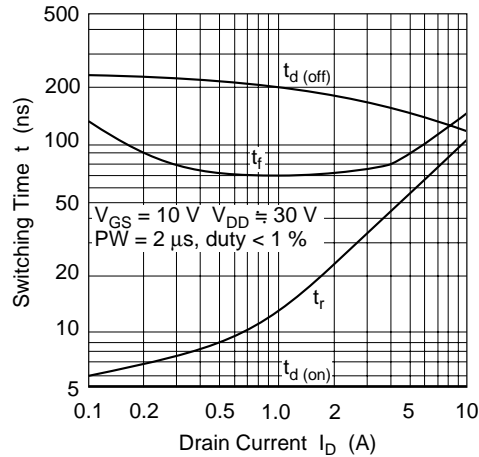
Typical Capacitance vs.  
Drain to Source Voltage



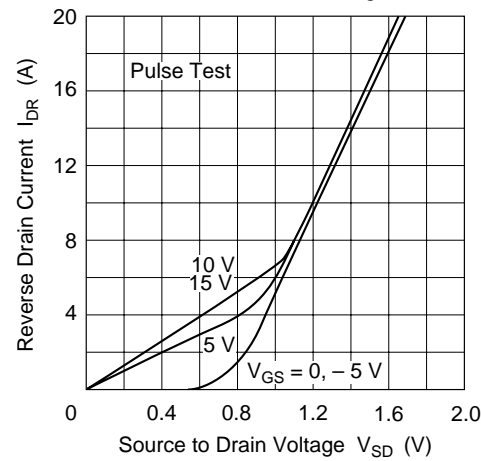
Dynamic Input Characteristics



Switching Characteristics



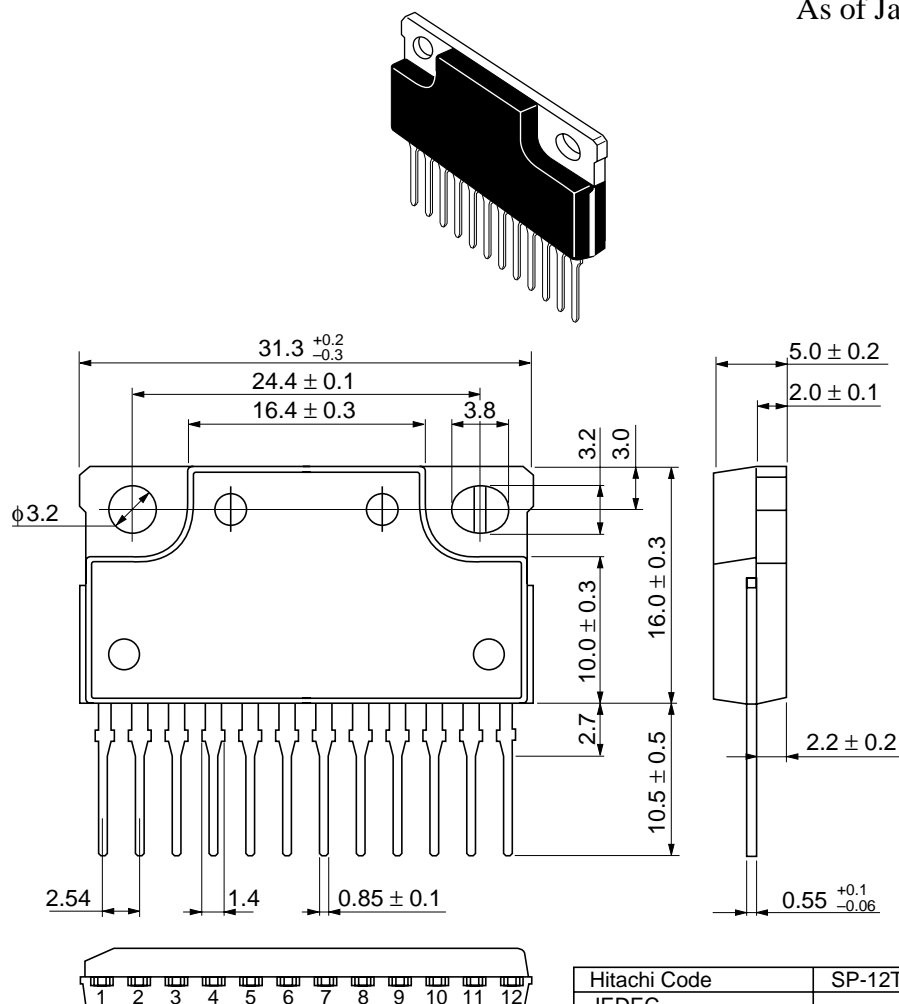
Reverse Drain Current vs.  
Source to Drain Voltage



# Package Dimensions

As of January, 2001

Unit: mm



Hitachi Code	SP-12TA
JEDEC	—
EIAJ	—
Mass (reference value)	6.1 g

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