4AJ11

Silicon P-Channel Power MOS FET Array

HITACHI

ADE-208-1199A (Z)
2nd. Edition
Mar. 2001

Application

High speed power switching

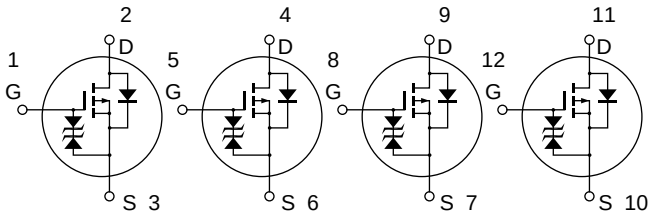
Features

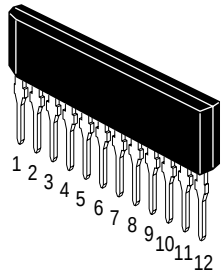
- Low on-resistance
  $R_{DS(on)}$ 0.13 , V_{GS} = –10 V, I_D = –4 A
  $R_{DS(on)}$ 0.17 , V_{GS} = –4 V, I_D = –4 A
- Capable of 4 V gate drive
- Low drive current
- High speed switching
- High density mounting
- Suitable for motor driver and solenoid driver and lamp driver

Hitachi semiconductor

Outline

SP-12





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

Absolute Maximum Ratings (Ta = 25°C)

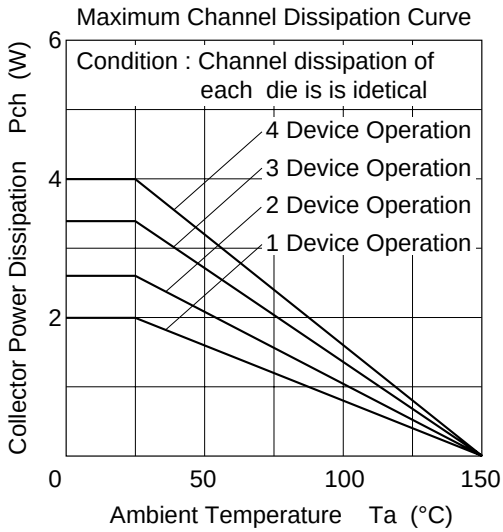
Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DSS}	–60	V
Gate to source voltage	V_{GSS}	±20	V
Drain current	I_D	–8	A
Drain peak current	$I_{D(pulse)}$*[1]	–32	A
Body to drain diode reverse drain current	I_{DR}	–8	A
Channel dissipation	Pch (Tc = 25°C)*[2]	28	W
Channel dissipation	Pch*[2]	4	W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	–55 to +150	°C

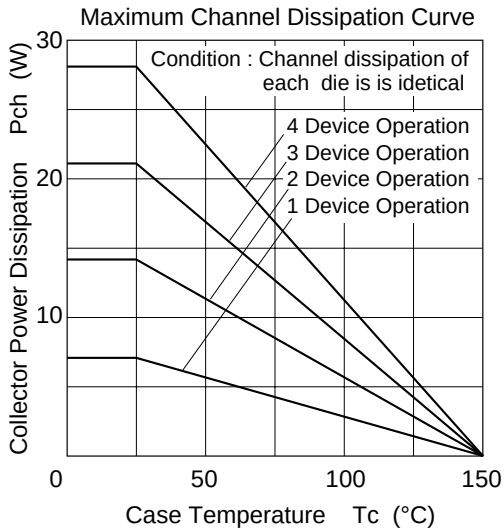
Notes: 1. PW 10 µs, duty cycle 1%
2. 4 Devices operation

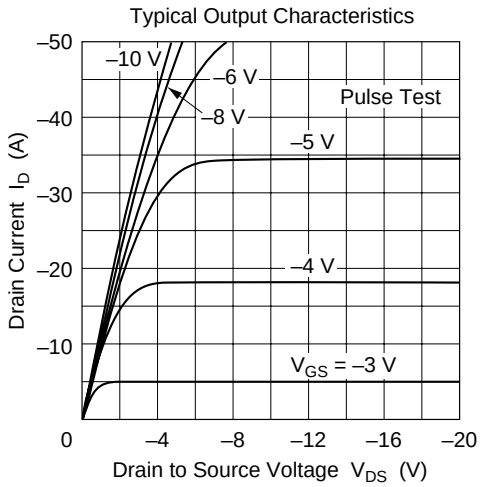
Electrical Characteristics (Ta = 25°C)

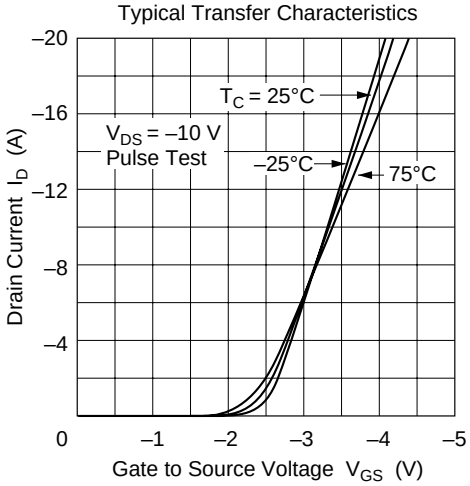
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	–60	—	—	V	I_D = –10 mA, V_{GS} = 0
Gate to source breakdown voltage	$V_{(BR)GSS}$	±20	—	—	V	I_G = ±100 µA, V_{DS} = 0
Gate to source leak current	I_{GSS}	—	—	±10	µA	V_{GS} = ±16 V, V_{DS} = 0
Zero gate voltage drain current	I_{DSS}	—	—	–250	µA	V_{DS} = –50 V, V_{GS} = 0
Gate to source cutoff voltage	$V_{GS(off)}$	–1.0	—	–2.0	V	I_D = –1 mA, V_{DS} = –10 V
Static drain to source on state resistance	$R_{DS(on)}$	—	0.09	0.13		I_D = –4 A V_{GS} = –10 V*[1]
		—	0.12	0.17		I_D = –4 A V_{GS} = –4 V*[1]
Forward transfer admittance	$\|y_{fs}\|$	5.5	7.7	—	S	I_D = –4 A V_{DS} = –10 V*[1]
Input capacitance	Ciss	—	1400	—	pF	V_{DS} = –10 V
Output capacitance	Coss	—	720	—	pF	V_{GS} = 0
Reverse transfer capacitance	Crss	—	220	—	pF	f = 1 MHz
Turn-on delay time	$t_{d(on)}$	—	15	—	ns	I_D = –8 A
Rise time	t_r	—	120	—	ns	V_{GS} = –10 V
Turn-off delay time	$t_{d(off)}$	—	220	—	ns	R_L = 3.75
Fall time	t_f	—	160	—	ns	
Body to drain diode forward voltage	V_{DF}	—	–1.05	—	V	I_F = –8 A, V_{GS} = 0
Body to drain diode reverse recovery time	t_{rr}	—	190	—	µs	I_F = –8 A, V_{GS} = 0, dIF/dt = 50 A/µs

Note: 1. Pulse Test

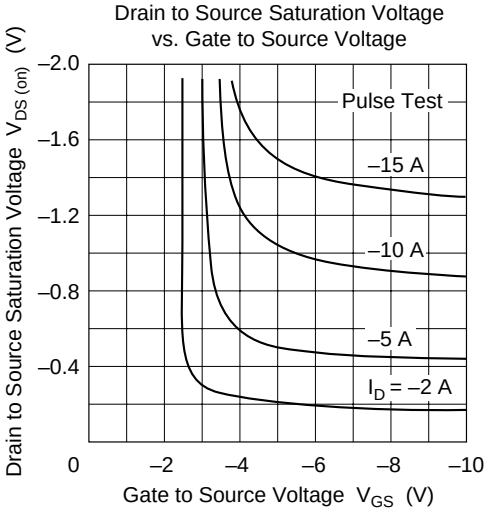

Maximum Channel Dissipation Curve
Condition : Channel dissipation of each die is is idetical
4 Device Operation
3 Device Operation
2 Device Operation
1 Device Operation
Collector Power Dissipation Pch (W)
Ambient Temperature Ta (°C)
0
2
4
6
50
100
150


Maximum Channel Dissipation Curve
Condition : Channel dissipation of each die is is idetical
4 Device Operation
3 Device Operation
2 Device Operation
1 Device Operation
Collector Power Dissipation Pch (W)
Case Temperature Tc (°C)
0
10
20
30
50
100
150

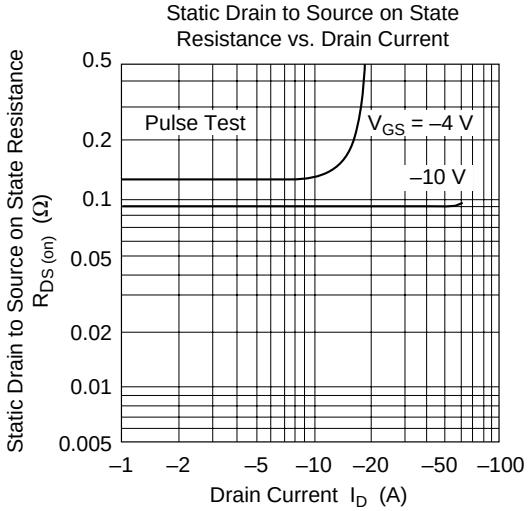

Typical Output Characteristics
–10 V
–6 V
–8 V
Pulse Test
–5 V
–4 V
V_{GS} = –3 V
Drain Current I_D (A)
Drain to Source Voltage V_{DS} (V)
0
–10
–20
–30
–40
–50
–4
–8
–12
–16
–20


Typical Transfer Characteristics
T_C = 25°C
V_{DS} = –10 V
Pulse Test
–25°C
75°C
Drain Current I_D (A)
Gate to Source Voltage V_{GS} (V)
0
–4
–8
–12
–16
–20
–1
–2
–3
–4
–5

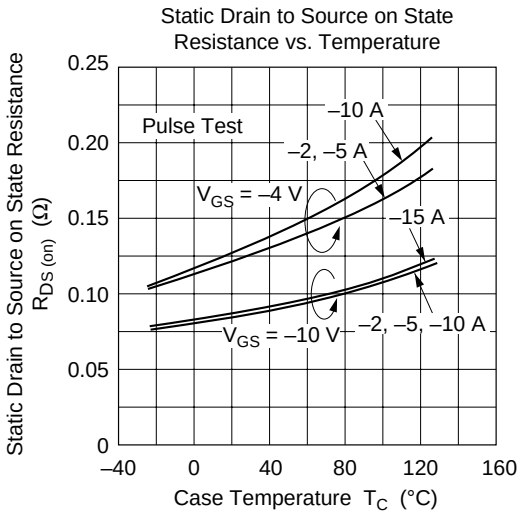
Drain to Source Saturation Voltage vs. Gate to Source Voltage



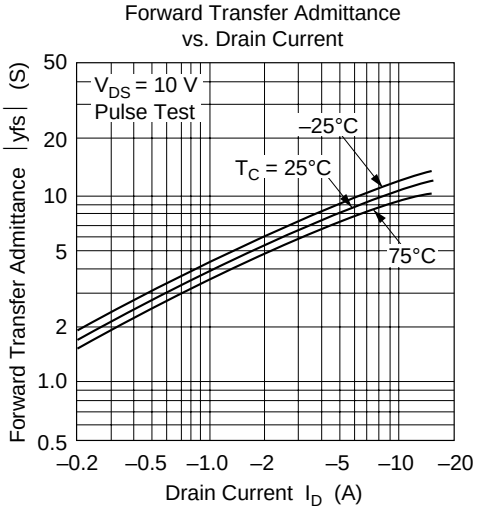
Static Drain to Source on State Resistance vs. Drain Current



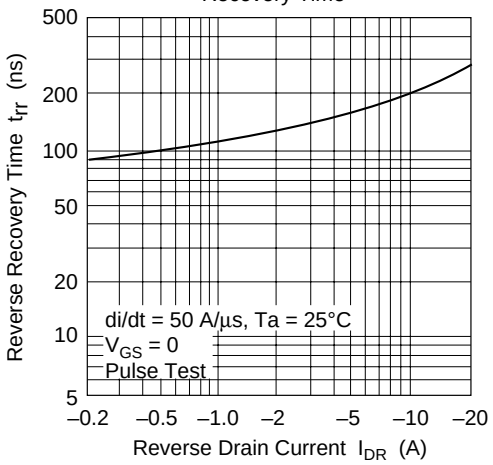
Static Drain to Source on State Resistance vs. Temperature



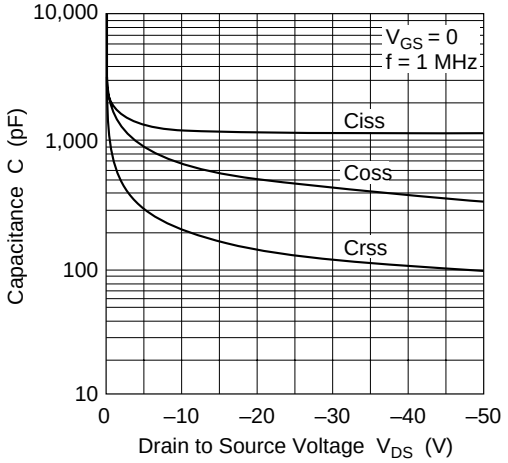
Forward Transfer Admittance vs. Drain Current



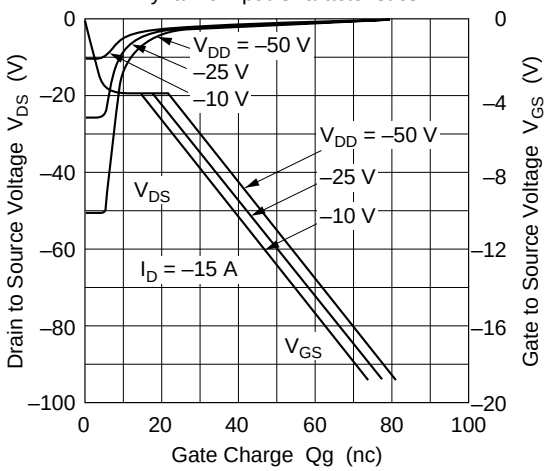
Body to Drain Diode Reverse Recovery Time



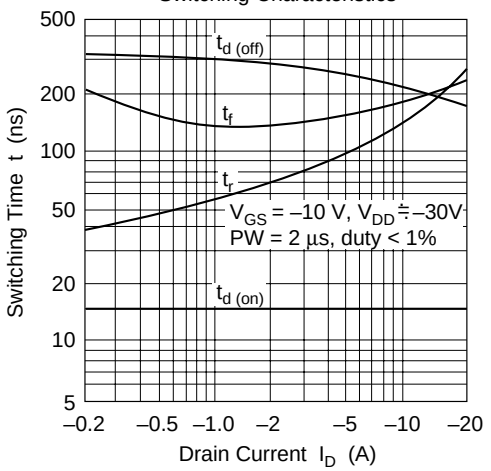
Typical Capacitance vs. Drain to Source Voltage

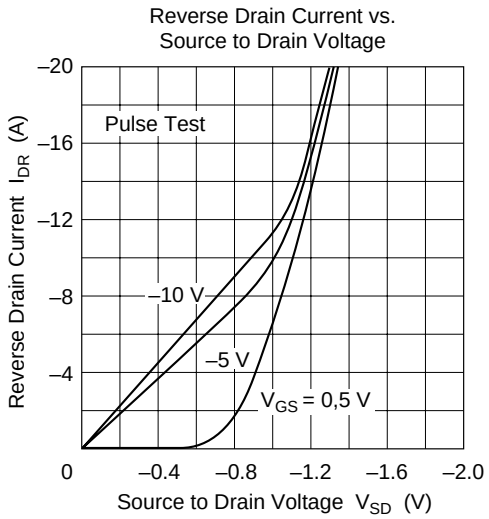


Dynamic Input Characteristics



Switching Characteristics

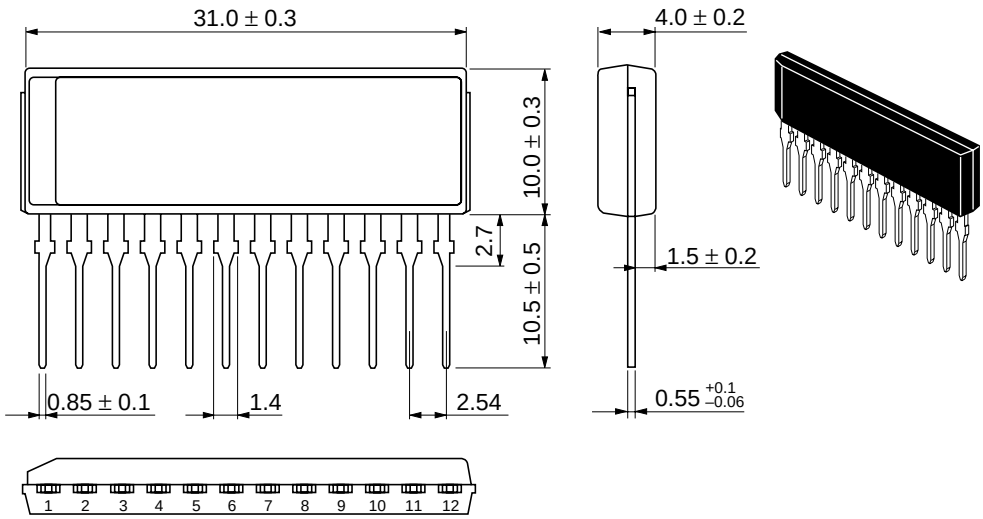



Reverse Drain Current vs.
Source to Drain Voltage
Pulse Test
–10 V
–5 V
V_{GS} = 0,5 V
Reverse Drain Current I_{DR} (A)
Source to Drain Voltage V_{SD} (V)
–20
–16
–12
–8
–4
0
–0.4
–0.8
–1.2
–1.6
–2.0

Package Dimensions

As of January, 2001

Unit: mm



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

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