SEMTECH CORPORATION
MICROELECTRONICS DIVISION

N-Channel Power MOSFETs, IN HERMETIC ISOLATED TO -254AA PACKAGE

SMD 2001
SMD 2002
SMD 2003
SMD 2004

Ideally suited for applications such as switching power supplies, motor controls, inverters, choppers, audio amplifiers, and high energy pulse circuits.

FEATURES

- Fast switching
- Low drive current
- Ease of paralleling
- No second breakdown
- Excellent temperature stability
- Available screened to SM883

QUICK REFERENCE DATA

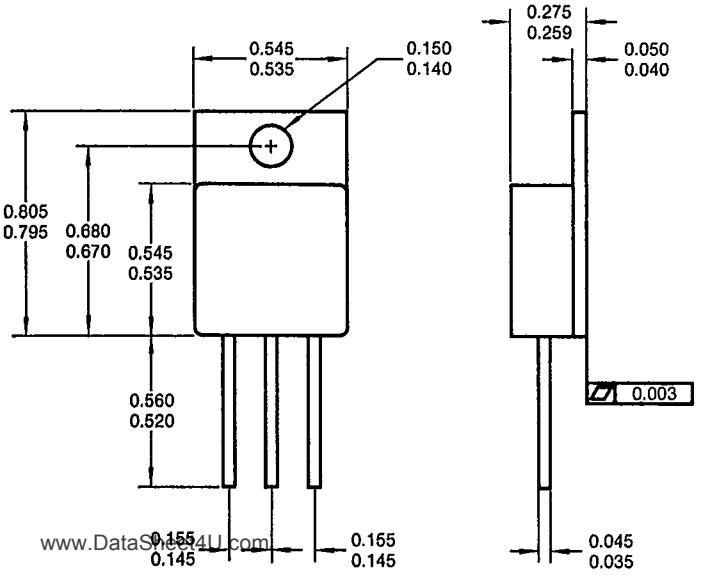
Part Number	V_{DS}	$R_{DS(on)}$	I_D
SMD 2001	500V	0.4Ω	13A
SMD 2002	450V	0.4Ω	13A
SMD 2003	500V	0.5Ω	12A
SMD 2004	450V	0.5Ω	12A

ABSOLUTE MAXIMUM RATINGS (@ 25°C unless otherwise specified)

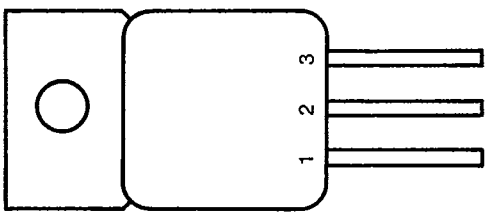
	Symbol	SMD 2001	SMD 2002	SMD 2003	SMD 2004	Unit
Drain-Source Voltage ①	V_{DS}	500	450	500	450	V
Drain-Gate Voltage (R_{GS} = 20 kΩ) ①	V_{DGR}	500	450	500	450	V
Continuous Drain Current	I_D @ T_C = 25°C	13	13	12	12	A
Continuous Drain Current	I_D @ T_C = 100°C	8.0	8.0	7.0	7.0	A
Pulsed Drain Current ②	I_{DM}	52	52	48	48	A
Gate-Source Voltage	V_{GS}	± 20				V
Operating Junction and Storage Temperature Range	T_J T_{stg}	-55 to 150				°C
Lead Temperature		300 (0.063 in. from case for 10s)				°C

① T_J = 25°C to 150°C
② Repetitive Rating. Pulse Width Limited By T_J Max

MECHANICAL



CONNECTIONS



1 Drain
2 Source
3 Gate

1 Gate
2 Drain
3 Source

Pin configuration available in non-isolated package. Consult factory for details.

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ELECTRICAL CHARACTERISTICS (@ 25°C unless otherwise specified)

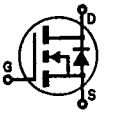
Symbol	Characteristic	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	SMD 2001 SMD 2003	500	—	—	V	V_{GS} = 0V
		SMD 2002 SMD 2004	450	—	—	V	I_D = 250µA
$V_{GS(th)}$	Gate Threshold Voltage	ALL	2.0	—	4.0	V	V_{DS} = V_{GS}, I_D = 250µA
I_{GSS}	Gate-Source Leakage Forward	ALL	—	—	100	nA	V_{GS} = 20V
I_{GSS}	Gate-Source Leakage Reverse	ALL	—	—	-100	nA	V_{GS} = -20V
I_{DSS}	Zero Gate Voltage Drain Current	ALL	—	—	250	µA	V_{DS} = Max. Rating, V_{GS} = 0V
			—	—	1000	µA	V_{DS} = Max. Rating x 0.8, V_{GS} = 0V, T_C = 125°C
$I_{D(on)}$	On-State Drain Current ②	SMD 2001 SMD 2002	13	—	—	A	V_{DS} > $I_{D(on)}$ x $R_{DS(on)}$ max., V_{GS} = 10V
		SMD 2003 SMD 2004	12	—	—	A	
$R_{DS(on)}$	Static Drain-Source On-State Resistance ②	SMD 2001 SMD 2002	—	0.3	0.4	Ω	V_{GS} = 10V, I_D = 7.0A
		SMD 2003 SMD 2004	—	0.4	0.5	Ω	
g_{fs}	Forward Transconductance ②	ALL	6.0	11	—	S(℧)	V_{DS} > $I_{D(on)}$ x $R_{DS(on)}$ max., I_D = 7.0A
C_{iss}	Input Capacitance	ALL	—	2000	3000	pF	V_{GS} = 0V, V_{DS} = 25V, f = 1.0 MHz
C_{oss}	Output Capacitance	ALL	—	400	600	pF	
C_{rss}	Revese Transfer Capacitance	ALL	—	100	200	pF	
$t_{d(on)}$	Turn-On Delay Time	ALL	—	—	35	ns	V_{DD} = 210V, I_D = 7.0A, Z_O = 4.7Ω
t_r	Rise Time	ALL	—	—	50	ns	
$t_{d(off)}$	Turn-Off Delay Time	ALL	—	—	150	ns	(MOSFET switching times are essentially independent of operating temperature.)
t_f	Fall Time	ALL	—	—	70	ns	
Q_g	Total Gate Charge (Gate-Source Plus Gate-Drain)	ALL	—	82	120	nC	V_{GS} = 10V, I_D = 16A, V_{DS} = 0.8 Max. Rating (Gate charge is essentially independent of operating temperature.)
Q_{gs}	Gate-Source Charge	ALL	—	40	—	nC	
Q_{gd}	Gate-Drain ("Miller") Charge	ALL	—	42	—	nC	

THERMAL CHARACTERISTICS

R_{thJC}	Junction-to-Case	ALL	—	—	.83	°C/W	
R_{thJA}	Junction-to-Ambient	ALL	—	—	30	°C/W	Free Air Operation

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

I_S	Continuous Source Current (Body Diode)	SMD 2001 SMD 2002	—	—	13	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier.
		SMD 2003 SMD 2004	—	—	12	A	
I_{SM}	Pulse source Current (Body Diode) ③	SMD 2001 SMD 2002	—	—	52	A	
		SMD 2003 SMD 2004	—	—	48	A	
V_{SD}	Diode Forward Voltage ②	SMD 2001 SMD 2002	—	—	1.4	V	T_C = 25°C, I_S = 13A, V_{GS} = 0V
		SMD 2003 SMD 2004	—	—	1.3	V	T_C = 25°C, I_S = 12A, V_{GS} = 0V
t_{rr}	Reverse Recovery Time	ALL	—	1300	—	ns	T_J = 150°C, I_F = 13A, dI_F/dt = 100A/µs
C_{RR}	Reverse Recovered Charge	ALL	—	7.4	—	µC	T_J = 150°C, I_F = 13A, dI_F/dt = 100A/µs
t_{on}	Forward Turn-On Time	ALL	Intrinsic turn-on time is negligible. Turn-on speed is substanially controlled by L_S + L_D				



① T_J = 25°C to 150°C. ② Pulse test: Pulse width ≤ 300µs, Duty Cycle ≤ 2% ③ Repetitive Rating: Pulse width limited by max. junction temperature.

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TYPICAL PERFORMANCE CURVES

Fig. 1. Output Characteristics

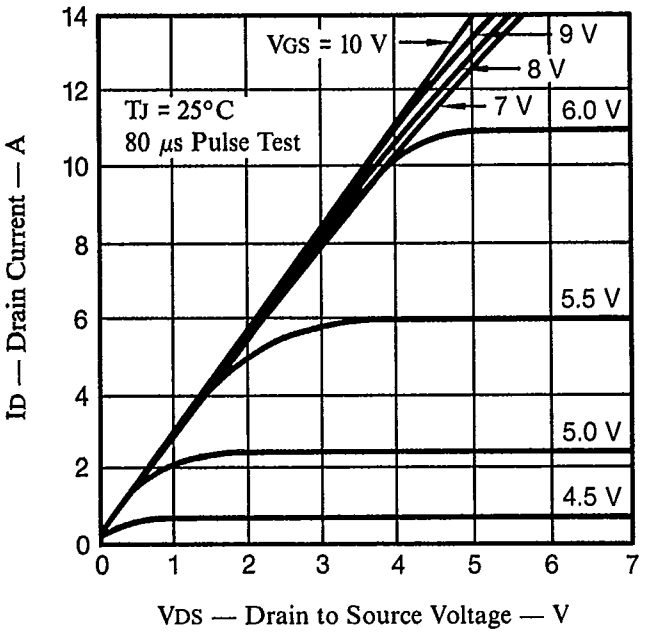

Fig. 2. Static Drain to Source Resistance vs Drain Current

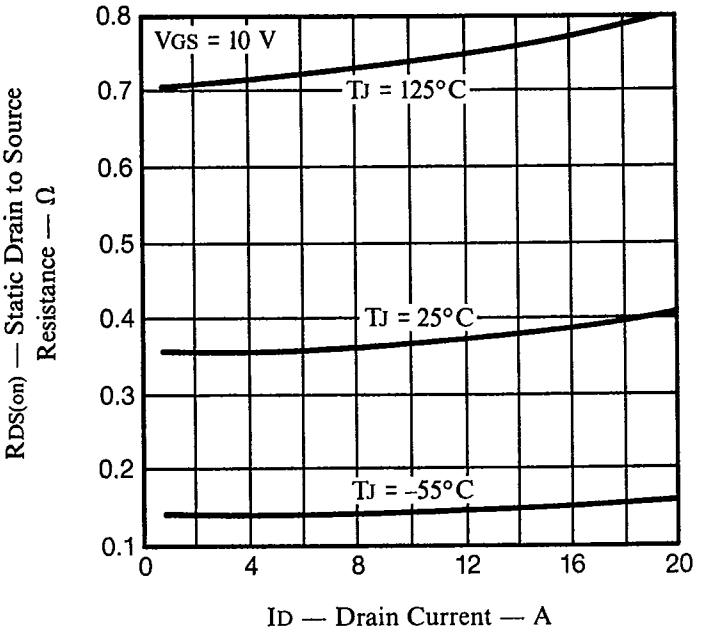

Fig. 3. Transfer Characteristics

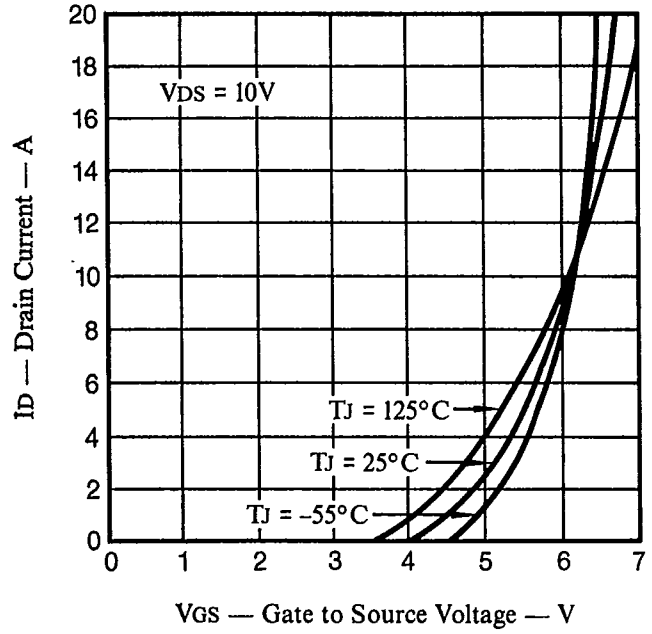

Fig. 4. Normalized On-Resistance vs Temperature