

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.

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

FEATURES

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

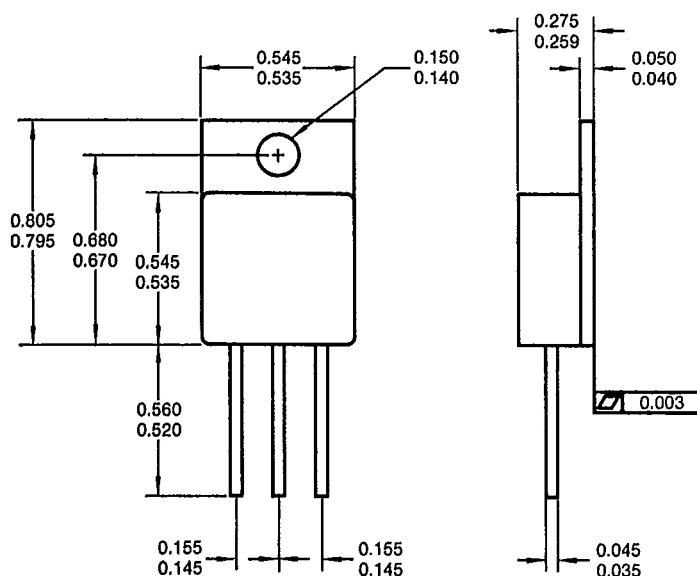
ABSOLUTE MAXIMUM RATINGS (@ 25°C unless otherwise specified)

	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

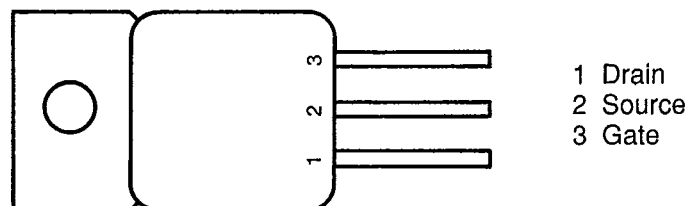
^① T_J = 25°C to 150°C

^② Repetitive Rating. Pulse Width Limited By T_J Max

MECHANICAL



CONNECTIONS



1 Gate
2 Drain
3 Source

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

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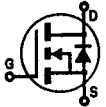
ELECTRICAL CHARACTERISTICS (@ 25°C unless otherwise specified)

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		
		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(Ω)	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}	Reverse 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	Free Air Operation
R _{thJA}	Junction-to-Ambient	ALL	—	—	30	°C/W	

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		
		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	
		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 substantially 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

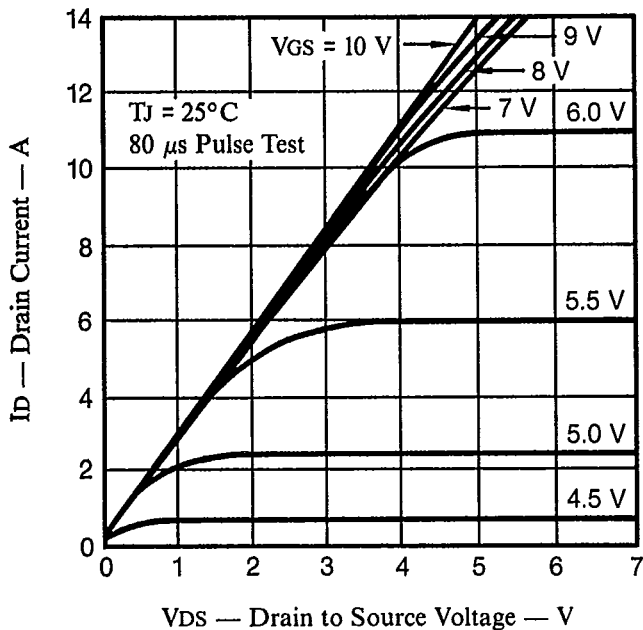


Fig. 2. Static Drain to Source Resistance vs Drain Current

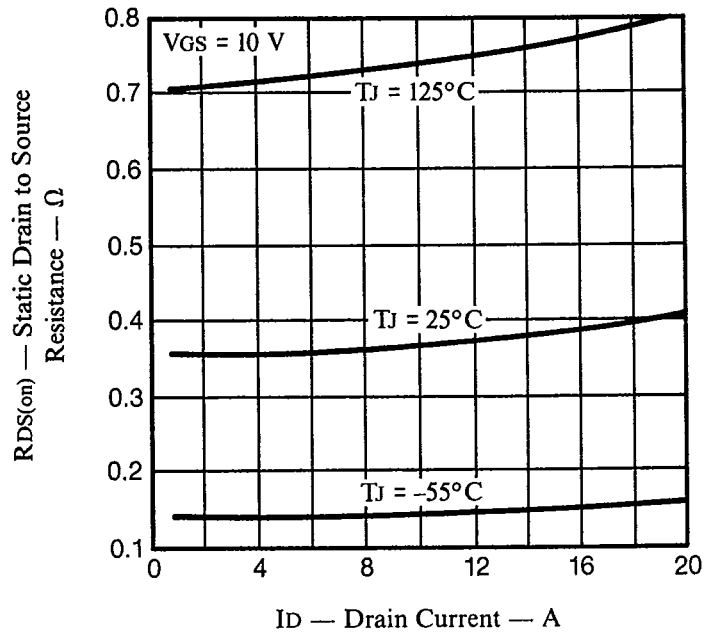


Fig. 3. Transfer Characteristics

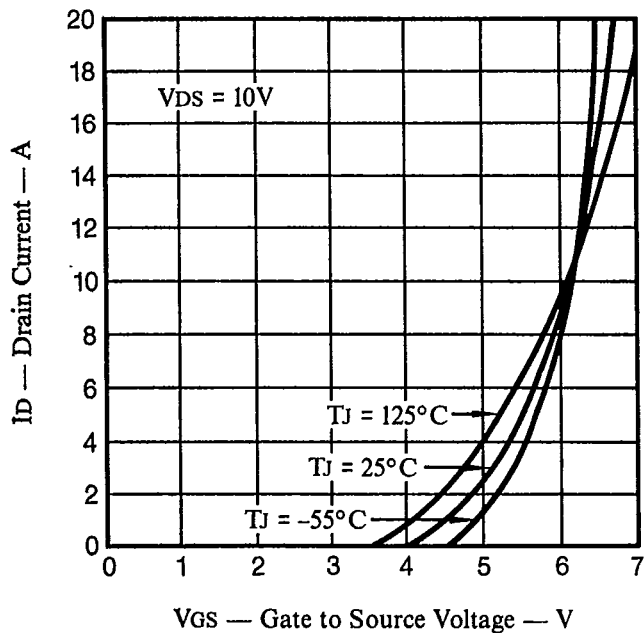


Fig. 4. Normalized On-Resistance vs Temperature

