

## DUAL POWER MOSFET's IN HERMETIC 6 PIN ISOLATED PACKAGE

**SM6F151\*\* SM6F251\*\***  
**SM6F351\*\* SM6F451\*\***

These devices offer the latest ruggedized MOSFET transistor die mounted in isolated and hermetically sealed metal packages. The standard MOSFET characteristics of very low on-state resistance and high transconductance are maintained. This product range features all of the proven advantages of MOSFET transistors such as excellent switching capability, low drive currents along with voltage control. These MOSFET power modules are ideally suited for applications such as switching power supplies or motor controls.

### FEATURES

Fast Switching  
Low Drive Current  
Ease of Paralleling  
Excellent Temperature Stability  
Available with High Reliability Screening

### QUICK REFERENCE DATA

- $V_{DS} = 100V-500V$
- $I_D = 30A$
- $R_{DS(ON)} = 0.070\Omega$

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

Parameter	Symbol	SM6F151	SM6F251	SM6F351	SM6F451	Units
Drain-Source Voltage	$V_{DS}$	100	200	400	500	V
Drain-Gate Voltage	$V_{DGR}$	100	200	400	500	V
Continuous Drain Current	$I_D @ T_C=25^\circ C$	30	27	14	12	A
Continuous Drain Current	$I_D @ T_C=100^\circ C$	24	17.4	9.0	7.5	A
Pulsed Drain Current (1)	$I_{DM}$	152	120	56	48	A
Max. Power Dissipation	$P_D @ T_C=25^\circ C$	150	150	150	150	W
Gate-Source Voltage	$V_{GS}$	20	20	20	20	V
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to 150	-55 to 150	-55 to 150	-55 to 150	°C

(1) Pulse Test: Pulsewidth = 300 $\mu$ s; Duty Cycle < 2%

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ELECTRICAL CHARACTERISTICS PER MOSFET (@ 25°C unless otherwise specified)

Symbol	Parameter	Device	Min.	Typ.	Max.	Units	Test Conditions
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	SM6F451	500	-	-	V	V <sub>GS</sub> =0V, I <sub>D</sub> =1.0mA
		SM6F351	400	-	-		
		SM6F251	200	-	-		
		SM6F151	100	-	-		
V <sub>GS(th)</sub>	Gate Threshold Voltage	all	2.0	-	4.0	V	V <sub>D</sub> S=V <sub>GS</sub> , I <sub>D</sub> =250μA
I <sub>GSS</sub>	Gate-Source Leakage	all	-	-	100	nA	V <sub>GS</sub> =20V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	all	-	-	50	μA	V <sub>D</sub> S=.8 x Rated V <sub>D</sub> S, V <sub>GS</sub> =0V
R <sub>DS(on)</sub>	Static Drain-Source On-State Resistance (1)	SM6F451	-	0.36	0.415	Ω	V <sub>GS</sub> =10V, I <sub>D</sub> =7.7A V <sub>GS</sub> =10V, I <sub>D</sub> =9.0A V <sub>GS</sub> =10V, I <sub>D</sub> =17A V <sub>GS</sub> =10V, I <sub>D</sub> =24A
		SM6F351	-	0.26	0.315		
		SM6F251	-	0.057	0.100		
		SM6F151	-	0.038	0.070		
g <sub>fs</sub>	Forward Transconductance (1)	SM6F451	5.0	8.5	-	S	V <sub>D</sub> S=15V, I <sub>D</sub> =7.2A V <sub>D</sub> S=15V, I <sub>D</sub> =8.6A V <sub>D</sub> S=15V, I <sub>D</sub> =16A V <sub>D</sub> S=15V, I <sub>D</sub> =22A
		SM6F351	8.7	8.0	-		
		SM6F251	10	16	-		
		SM6F151	12	18	-		
C <sub>iss</sub>	Input Capacitance	SM6F451	-	2400	-	pF	V <sub>GS</sub> =0V, V <sub>D</sub> S=25V, f=1.0MHz
		SM6F351	-	2400	-		
		SM6F251	-	2400	-		
		SM6F151	-	2400	-		
C <sub>oss</sub>	Output Capacitance	SM6F451	-	440	-	pF	V <sub>GS</sub> =0V, V <sub>D</sub> S=25V, f=1.0MHz
		SM6F351	-	500	-		
		SM6F251	-	800	-		
		SM6F151	-	1000	-		
C <sub>rss</sub>	Reverse Transfer Capacitance	SM6F451	-	100	-	pF	V <sub>GS</sub> =0V, V <sub>D</sub> S=25V, f=1.0MHz
		SM6F351	-	100	-		
		SM6F251	-	210	-		
		SM6F151	-	210	-		
t <sub>d(on)</sub>	Turn-On Delay Time	SM6F451	-	13	20	ns	V <sub>D</sub> D=0.5 V <sub>D</sub> S max., I <sub>D</sub> =I <sub>D</sub> max @ 25°C
		SM6F351	-	12	18		
		SM6F251	-	20	30		
		SM6F151	-	19	29		
t <sub>r</sub>	Rise Time	SM6F451	-	68	100	ns	V <sub>D</sub> D=0.5 V <sub>D</sub> S max., I <sub>D</sub> =I <sub>D</sub> max @ 25°C
		SM6F351	-	51	77		
		SM6F251	-	120	180		
		SM6F151	-	110	170		
t <sub>d(off)</sub>	Turn-Off Delay Time	SM6F451	-	71	110	ns	V <sub>D</sub> D=0.5 V <sub>D</sub> S max., I <sub>D</sub> =I <sub>D</sub> max @ 25°C
		SM6F351	-	75	110		
		SM6F251	-	70	100		
		SM6F151	-	60	90		
t <sub>f</sub>	Fall Time	SM6F451	-	48	72	ns	V <sub>D</sub> D=0.5 V <sub>D</sub> S max., I <sub>D</sub> =I <sub>D</sub> max @ 25°C
		SM6F351	-	47	71		
		SM6F251	-	80	120		
		SM6F151	-	72	110		
Q <sub>g(on)</sub>	On State Gate Charge	SM6F451	-	83	120	nC	V <sub>GS</sub> =10V, I <sub>D</sub> =I <sub>D</sub> max @ 25°C, V <sub>D</sub> S=.8 max RATING
		SM6F351	-	81	110		
		SM6F251	-	90	115		
		SM6F151	-	79	125		
Q <sub>gs</sub>	Gate-Source Charge	SM6F451	-	11	19	nC	V <sub>GS</sub> =10V, I <sub>D</sub> =I <sub>D</sub> max @ 25°C, V <sub>D</sub> S=.8 max RATING
		SM6F351	-	11	18		
		SM6F251	-	14	21		
		SM6F151	-	14	25		
Q <sub>gd</sub>	Gate-Drain Charge	SM6F451	-	42	70	nC	V <sub>GS</sub> =10V, I <sub>D</sub> =I <sub>D</sub> max @ 25°C, V <sub>D</sub> S=.8 max RATING
		SM6F351	-	43	65		
		SM6F251	-	49	60		
		SM6F151	-	39	65		

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### SINGLE MOSFET SOURCE-DRAIN DIODE RATINGS & CHARACTERISTICS

Symbol	Parameter	Device	Min.	Typ.	Max.	Units	Test Conditions
IS	Continuous Source Current (Body Diode)	SM6F451	-	-	12	A	
		SM6F351	-	-	14		
		SM6F251	-	-	27.4		
		SM6F151	-	-	30		
ISM	Pulsed Source Current (Body Diode)	SM6F451	-	-	44	A	
		SM6F351	-	-	56		
		SM6F251	-	-	96		
		SM6F151	-	-	100		
VSD	Diode Forward Voltage (1)	SM6F451	-	-	1.7	V	T <sub>J</sub> =25°C, I <sub>S</sub> =I <sub>S</sub> max., V <sub>GS</sub> =0V
		SM6F351	-	-	1.7		
		SM6F251	-	-	1.9		
		SM6F151	-	-	1.9		
trr	Reverse Recovery Time	SM6F451	320	790	1800	ns	T <sub>J</sub> =25°C, I <sub>F</sub> =I <sub>S</sub> max., dI/dt=100 A/s
		SM6F351	270	600	1300		
		SM6F251	190	420	950		
		SM6F151	77	160	370		
Qrr	Reverse Recovery Charge	SM6F451	1.8	4.6	11	μC	T <sub>J</sub> =25°C, I <sub>F</sub> =I <sub>S</sub> max., dI/dt=100 A/s
		SM6F351	1.7	3.8	8.1		
		SM6F251	1.0	2.3	5.6		
		SM6F151	0.49	1.20	2.8		

(1) Pulse Test: Pulsewidth = 300μs; Duty Cycle < 2%

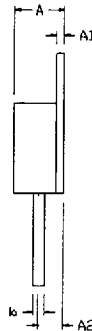
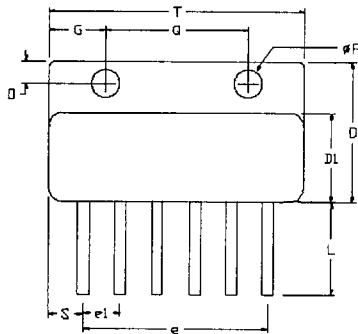
### THERMAL RESISTANCE

Symbol	Parameter	Device	Per FET	Total	Units
R <sub>θJC</sub>	Junction to Case	All	0.83	0.58	°C/W
R <sub>θJA</sub>	Junction to Ambient		30	30	°C/W

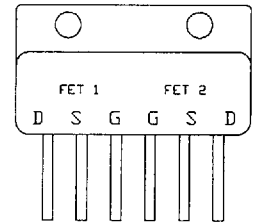
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### MECHANICAL OUTLINE AND CONFIGURATION



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	6.10	6.60	.240	.260
A1	1.14	1.40	.045	.055
A2	3.81 BSC		.150 BSC	
k	1.40	1.65	.055	.065
J	1.88	19.3	.740	.760
D1	11.81	12.32	.465	.485
e1		5.08		.200 BSC
e	25.27	26.67	.995	1.05
G	7.37	7.87	.290	.310
L	13.46	13.97	.530	.550
D	2.87	3.12	.113	.123
P	3.68	3.94	.145	.155
Q	19.43	19.69	.765	.775
S	4.32	5.03	.178	.198
T	34.80	35.31	1.370	1.390



### ORDERING INFORMATION

The last two characters of the SEMTECH part numbering system identify the lead bend configuration and the level of testing required. All devices are tested for hermeticity and compliance to the appropriate electrical characteristics.

#### Lead Bend

- S- Straight Leads
- D- 90° Bend Down (see fig. 12 at the end of this section)

#### Screening

- U- Unscreened
- T- Screening per MIL-S-19500 Table II
- F- Screening per MIL-S-19500/543 Table II

e.g. SM6F451DF is a SM6F451 with bent leads and screening to MIL-S-19500/543 Table II

(Unless specified by the customer, devices will have straight leads and be unscreened.)

PACKAGE OUTLINE DRAWINGS

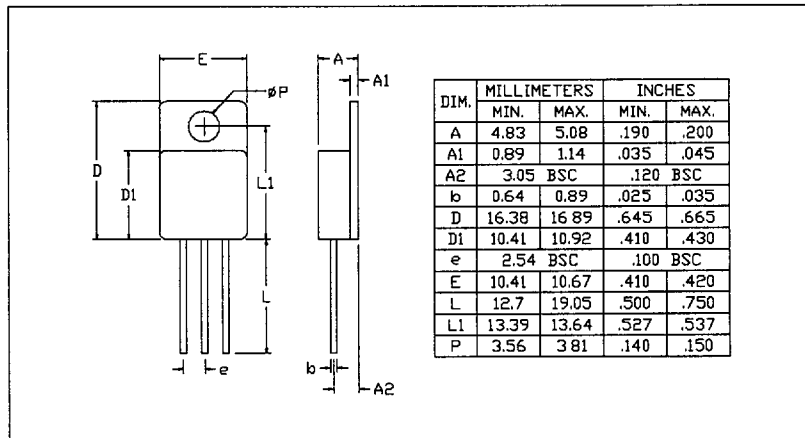


Fig.1 STRAIGHT LEAD TO257AA (S-SUFFIX)

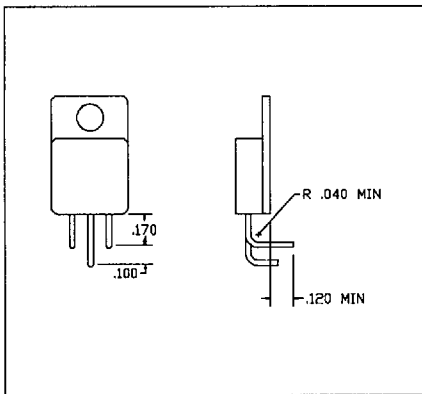


Fig.2 CLAW BEND TO257AA (C-SUFFIX)

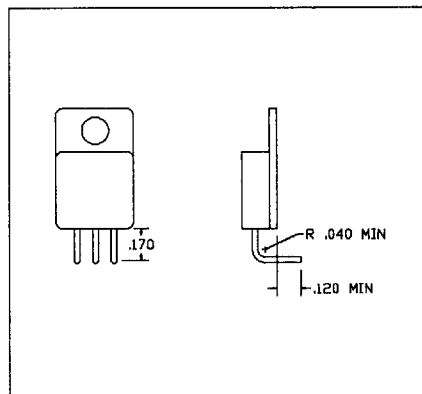


Fig.3 BENT DOWN LEAD TO257AA (D-SUFFIX)

PACKAGE OUTLINE DRAWINGS

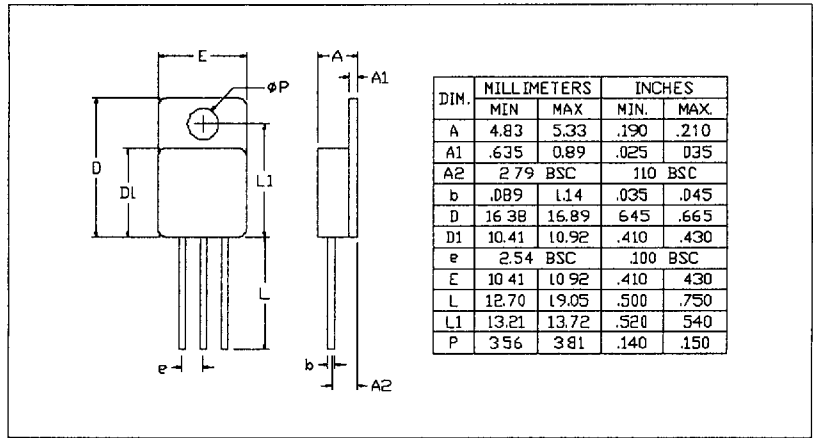


Fig.4 STRAIGHT LEAD TO257AB (S-SUFFIX)

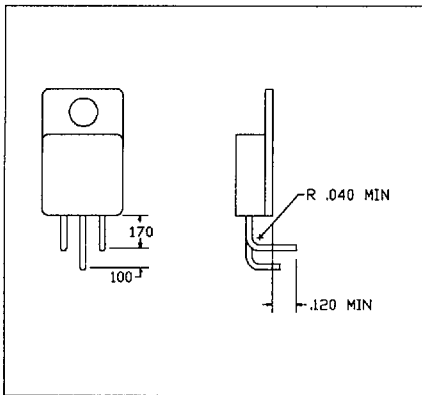


Fig.5 CLAW BEND TO257AB (C-SUFFIX)

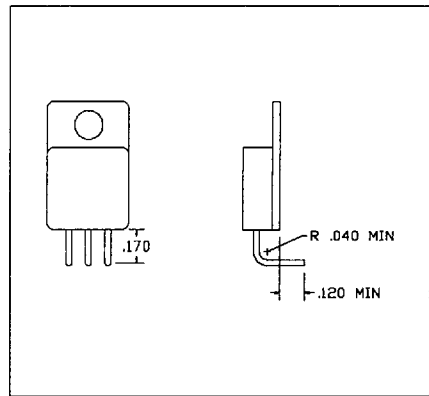


Fig.6 BENT DOWN LEAD TO257AB (D-SUFFIX)

PACKAGE OUTLINE DRAWINGS

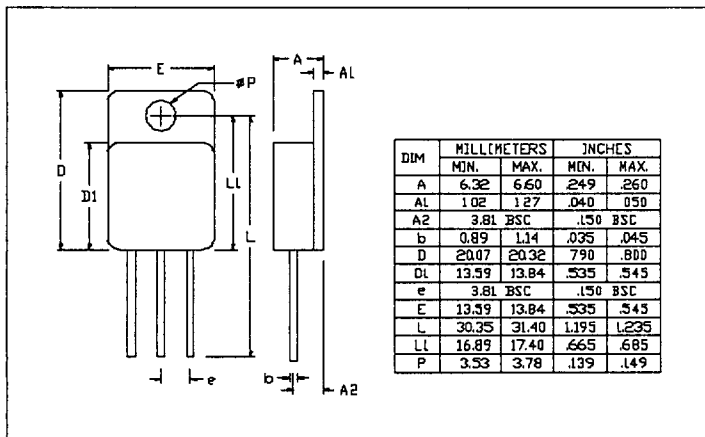


Fig.7 STRAIGHT LEAD TO254AA (S-SUFFIX)

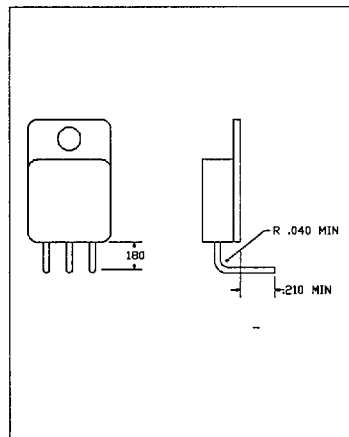


Fig.8 BENT DOWN LEAD TO254AA (D-SUFFIX)

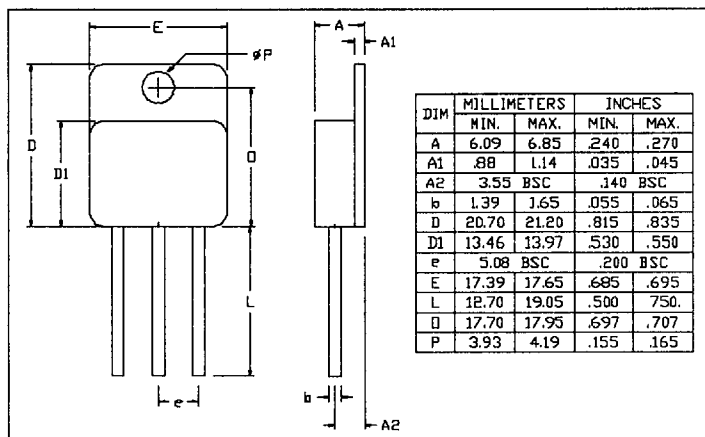


Fig.9 STRAIGHT LEAD TO258AA (S-SUFFIX)

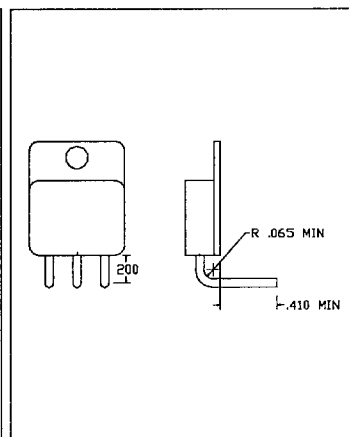


Fig.10 BENT DOWN LEAD TO258AA (D-SUFFIX)

PACKAGE OUTLINE DRAWINGS

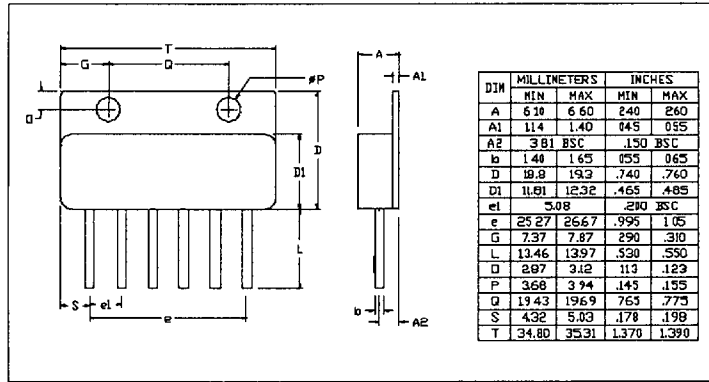


Fig.11 STRAIGHT LEAD 6 PIN TOP MOUNT (S-SUFFIX)

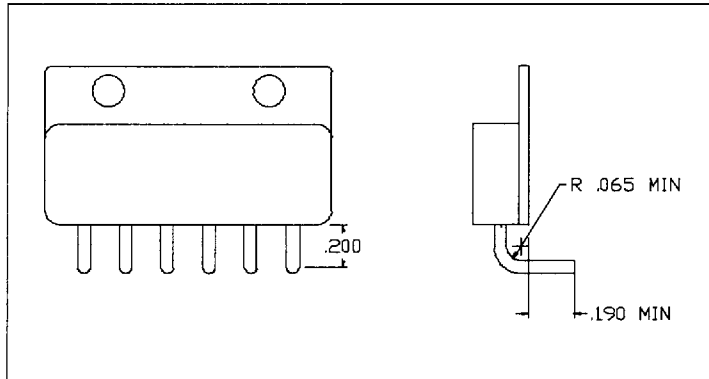


Fig.12 BENT DOWN 6 PIN TOP MOUNT (D-SUFFIX)

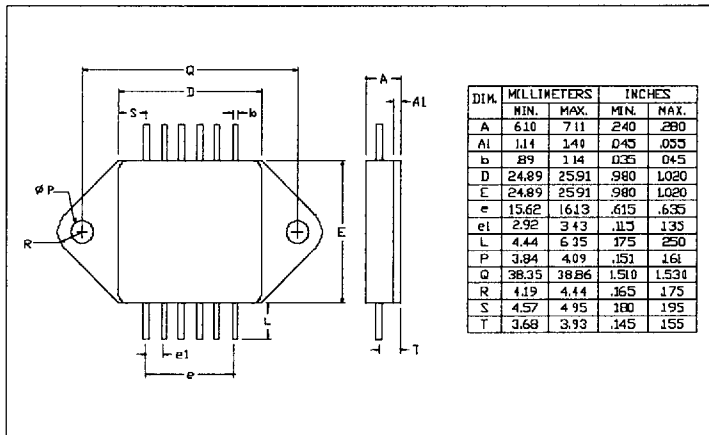


Fig.13 12 PIN "QUADPACK"