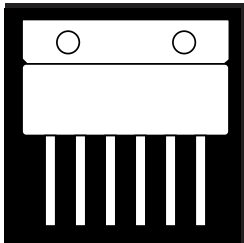


POWER MOSFET AND HIGH EFFICIENCY RECTIFIER IN A SINGLE HERMETIC ISOLATED SIP PACKAGE



100V Thru 500V, Up To 30 Amp, N-Channel MOSFET With Back To Back Zener Gate Clamp Protection And Uncommitted Ultra-Fast Recovery 35 To 50 nsec Rectifier

FEATURES

- Isolated Single In Line Hermetic Package
- Bi-Lateral Zener Gate Protection
- Uncommitted Power MOSFET And High Efficiency Power Rectifier
- Low $R_{DS(on)}$
- Available Hi-Rel Screened To MIL-S-19500, TX, TXV and S Levels

DESCRIPTION

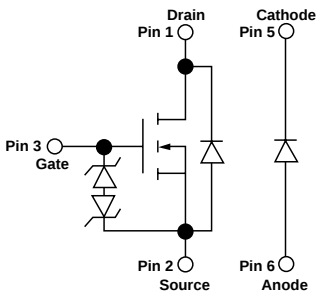
This series of products feature the latest advanced MOSFET and rectifier in a single, cost effective hermetically sealed package. They are ideally suited for Military requirements where small size, high performance and high reliability are required, and in applications such as flyback switching power supplies, motor control choppers, and high energy pulse circuits. The MOSFET gates are protected using bi-lateral zener clamps.

MAXIMUM RATINGS

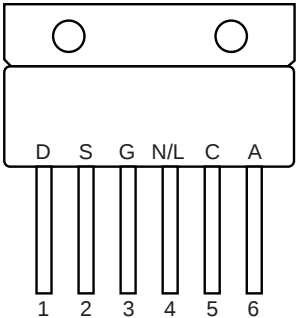
PART NUMBER	MOSFET			RECTIFIER		
	V_{DS}	$R_{DS(on)}$	I_D	PIV	V_{FM}	t_{rr}
OM9001SS	100 V	.065	30 A	100 V	1.40 A	35 ns
OM9002SS	200 V	.095	25 A	200 V	1.20 A	35 ns
OM9003SS	400 V	.3	15 A	400 V	1.40 A	50 ns
OM9004SS	500 V	.4	13 A	500 V	1.55 A	50 ns

3.1

SCHEMATIC



PIN CONNECTION



MOSFET CHARACTERISTICS: (T_C = 25°C unless otherwise noted)
STATIC P/N OM9001SS

Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV _{DSS} Drain-Source Breakdown Voltage	100			V	V _{GS} = 0, I _O = 250 mA
V _{GS(th)} Gate-Threshold Voltage	2.0		4.0	V	V _{DS} = V _{GS} , I _D = 250 mA
I _{GSSF} Gate-Body Leakage Forward			+500	nA	V _{GS} = +12.8 V
I _{GSSR} Gate-Body Leakage Reverse			- 500	nA	V _{GS} = -12.8 V
I _{DSS} Zero Gate Voltage Drain Current		0.1	0.25	mA	V _{DS} = Max. Rat., V _{GS} = 0
		0.2	1.0	mA	V _{DS} = 0.8 Max. Rat., V _{GS} = 0, T _C = 125° C
I _{D(on)} On-State Drain Current ¹	30			A	V _{DS} = 2 V _{DS(on)} , V _{GS} = 10 V
V _{DS(on)} Static Drain-Source On-State Voltage ¹		1.1	1.3	V	V _{GS} = 10 V, I _D = 20 A
R _{DS(on)} Static Drain-Source On-State Resistance ¹		.053	.065		V _{GS} = 10 V, I _D = 20 A
R _{DS(on)} Static Drain-Source On-State Resistance ¹		.09	.11		V _{GS} = 10 V, I _D = 20 A, T _C = 125 C

DYNAMIC

g _{fs} Forward Transductance ¹	9.0	10		S (M)	V _{DS} = 2 V _{DS(on)} , I _D = 20 A
C _{iss} Input Capacitance		2700		pF	V _{GS} = 0
C _{oss} Output Capacitance		1300		pF	V _{DS} = 25 V
C _{rss} Reverse Transfer Capacitance		470		pF	f = 1 MHz
t _{d(on)} Turn-On Delay Time		28		ns	V _{DD} = 30 V, I _D @ 20 A
t _r Rise Time		45		ns	R _g = 5.0 W, V _G = 10V
t _{d(off)} Turn-Off Delay Time		100		ns	
t _f Fall Time		50		ns	

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

I _S Continuous Source Current (Body Diode)			- 30	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier.
I _{SM} Source Current ¹ (Body Diode)			- 140	A	
V _{SD} Diode Forward Voltage ¹			- 2.5	V	T _C = 25 C, I _S = -40 A, V _{GS} = 0
t _{rr} Reverse Recovery Time		400		ns	T _J = 150 C, I _F = I _S , dI _F /ds = 100 A/ms

1 Pulse Test: Pulse Width 300msec, Duty Cycle 2%.

POWER RECTIFIER CHARACTERISTICS

PIV	Max. Reverse Current		Max. Forward Voltage		*Max. Reverse Recovery Time
	T _J = 25°C	T _J = 125°C	T _J = 25°C	T _J = 125°C	
100 V	20 µA	1 mA	1.40 V @ 20 Amp	1.25 V @ 20 Amp	35 nsec

*Measured in circuit, I_F = .5 A, I_R = 1 A, I_{REC} = .250 A.

MOSFET CHARACTERISTICS: (T_C = 25°C unless otherwise noted)
STATIC P/N OM9002SS

Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV _{DSS} Drain-Source Breakdown Voltage	200			V	V _{GS} = 0, I _O = 250 mA
V _{GS(th)} Gate-Threshold Voltage	2.0		4.0	V	V _{DS} = V _{GS} , I _D = 250 mA
I _{GSSF} Gate-Body Leakage Forward			+500	nA	V _{GS} = + 12.8 V
I _{GSSR} Gate-Body Leakage Reverse			-500	nA	V _{GS} = - 12.8 V
I _{DSS} Zero Gate Voltage Drain Current		0.1	0.25	mA	V _{DS} = Max. Rat., V _{GS} = 0
		0.2	1.0	mA	V _{DS} = 0.8 Max. Rat., V _{GS} = 0, T _C = 125° C
I _{D(on)} On-State Drain Current ¹	25			A	V _{DS} = 2 V _{DS(on)} , V _{GS} = 10 V
V _{DS(on)} Static Drain-Source On-State Voltage ¹		1.36	1.52	V	V _{GS} = 10 V, I _D = 16 A
R _{DS(on)} Static Drain-Source On-State Resistance ¹		.085	.095		V _{GS} = 10 V, I _D = 16 A
R _{DS(on)} Static Drain-Source On-State Resistance ¹		0.14	0.17		V _{GS} = 10 V, I _D = 16 A, T _C = 125 C

DYNAMIC

g _{fs} Forward Transductance ¹	10.0	12.5		S (M)	V _{DS} = 2 V _{DS(on)} , I _D = 16 A
C _{iss} Input Capacitance		2400		pF	V _{GS} = 0
C _{oss} Output Capacitance		600		pF	V _{DS} = 25 V
C _{rss} Reverse Transfer Capacitance		250		pF	f = 1 MHz
t _{d(on)} Turn-On Delay Time		25		ns	V _{DD} = 75 V, I _D @ 16 A
t _r Rise Time		60		ns	R _g = 5.0 W, V _G = 10V
t _{d(off)} Turn-Off Delay Time		85		ns	
t _f Fall Time		38		ns	

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

I _S Continuous Source Current (Body Diode)			- 25	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier.
I _{SM} Source Current ¹ (Body Diode)			- 100	A	
V _{SD} Diode Forward Voltage ¹			- 2	V	T _C = 25 C, I _S = -30 A, V _{GS} = 0
t _{rr} Reverse Recovery Time		350		ns	T _J = 150 C, I _F = I _S , dI _F /ds = 100 A/ms

1 Pulse Test: Pulse Width 300msec, Duty Cycle 2%.

POWER RECTIFIER CHARACTERISTICS

PIV	Max. Reverse Current		Max. Forward Voltage		*Max. Reverse Recovery Time
	T _J = 25°C	T _J = 125°C	T _J = 25°C	T _J = 125°C	
200 V	20 µA	1.0 mA	1.2 V @ 15 Amp	1.00 V @ 15 Amp	35 nsec

*Measured in circuit, I_F = .5 A, I_R = 1 A, I_{REC} = .250 A.

MOSFET CHARACTERISTICS: ($T_C = 25^\circ\text{C}$ unless otherwise noted)
STATIC P/N OM9003SS

Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS} Drain-Source Breakdown Voltage	400			V	$V_{GS} = 0$ $I_D = 250 \text{ mA}$
$V_{GS(th)}$ Gate-Threshold Voltage	2.0		4.0	V	$V_{DS} = V_{GS}$, $I_D = 250 \text{ mA}$
I_{GSSF} Gate-Body Leakage Forward			+500	nA	$V_{GS} = +12.8 \text{ V}$
I_{GSSR} Gate-Body Leakage Reverse			- 500	nA	$V_{GS} = - 12.8 \text{ V}$
I_{OSS} Zero Gate Voltage Drain Current	0.1	0.25		mA	$V_{DS} = \text{Max. Rat.}$, $V_{GS} = 0$
	0.2	1.0		mA	$V_{DS} = 0.8 \text{ Max. Rat.}$, $V_{GS} = 0$ $T_C = 125^\circ \text{C}$
$I_{D(on)}$ On-State Drain Current ¹	15			A	$V_{DS} = 2 V_{DS(on)}$, $V_{GS} = 10 \text{ V}$
$V_{DS(on)}$ Static Drain-Source On-State Voltage ¹		2.0	2.4	V	$V_{GS} = 10 \text{ V}$, $I_D = 8.0 \text{ A}$
$R_{DS(on)}$ Static Drain-Source On-State Resistance ¹		0.25	0.3		$V_{GS} = 10 \text{ V}$, $I_D = 8.0 \text{ A}$
$R_{DS(on)}$ Static Drain-Source On-State Resistance ¹		0.50	0.60		$V_{GS} = 10 \text{ V}$, $I_D = 8.0 \text{ A}$ $T_C = 125^\circ \text{C}$

DYNAMIC

g_{fs} Forward Transductance ¹	6.0	9.6		S (M)	$V_{DS} = 2 V_{DS(on)}$, $I_D = 8.0 \text{ A}$
C_{iss} Input Capacitance		2900		pF	$V_{GS} = 0$
C_{oss} Output Capacitance		450		pF	$V_{DS} = 25 \text{ V}$
C_{rss} Reverse Transfer Capacitance		150		pF	$f = 1 \text{ MHz}$
$t_{d(on)}$ Turn-On Delay Time		30		ns	$V_{DS} = 200 \text{ V}$, $I_D @ 8.0 \text{ A}$
t_r Rise Time		40		ns	$R_g = 5.0 \text{ W}$, $V_G = 10 \text{ V}$
$t_{d(off)}$ Turn-Off Delay Time		80		ns	
t_f Fall Time		30		ns	

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

I_S Continuous Source Current (Body Diode)			- 15	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier.
I_{SM} Source Current ¹ (Body Diode)			- 60	A	
V_{SD} Diode Forward Voltage ¹			- 1.6	V	$T_C = 25^\circ \text{C}$, $I_S = -15 \text{ A}$, $V_{GS} = 0$
t_{rr} Reverse Recovery Time		400		ns	$T_J = 100^\circ \text{C}$, $I_R = I_S$, $di/dt = 100 \text{ A/ms}$

1 Pulse Test: Pulse Width 300msec, Duty Cycle 2%.

POWER RECTIFIER CHARACTERISTICS

PIV	Max. Reverse Current		Max. Forward Voltage		*Max. Reverse Recovery Time
	$T_J = 25^\circ\text{C}$	$T_J = 125^\circ\text{C}$	$T_J = 25^\circ\text{C}$	$T_J = 125^\circ\text{C}$	
400 V	20 μA	1.0mA	1.40 V @ 8 Amp	1.25 V @ 8 Amp	50 nsec

*Measured in circuit, $I_F = .5 \text{ A}$, $I_R = 1 \text{ A}$, $I_{REC} = .250 \text{ A}$.

MOSFET CHARACTERISTICS: ($T_C = 25^\circ\text{C}$ unless otherwise noted)
STATIC P/N OM9004SS

Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS} Drain-Source Breakdown Voltage	500			V	$V_{GS} = 0$ $I_D = 250 \text{ mA}$
$V_{GS(th)}$ Gate-Threshold Voltage	2.0		4.0	V	$V_{DS} = V_{GS}$, $I_D = 250 \text{ mA}$
I_{GSSF} Gate-Body Leakage Forward			+500	nA	$V_{GS} = +12.8 \text{ V}$
I_{GSSR} Gate-Body Leakage Reverse			- 500	nA	$V_{GS} = - 12.8 \text{ V}$
I_{OSS} Zero Gate Voltage Drain Current	0.1	0.25		mA	$V_{DS} = \text{Max. Rat.}$, $V_{GS} = 0$
	0.2	1.0		mA	$V_{DS} = 0.8 \text{ Max. Rat.}$, $V_{GS} = 0$ $T_C = 125^\circ \text{C}$
$I_{D(on)}$ On-State Drain Current ¹	13			A	$V_{DS} = 2 V_{DS(on)}$, $V_{GS} = 10 \text{ V}$
$V_{DS(on)}$ Static Drain-Source On-State Voltage ¹		2.1	2.8	V	$V_{GS} = 10 \text{ V}$, $I_D = 7.0 \text{ A}$
$R_{DS(on)}$ Static Drain-Source On-State Resistance ¹		0.3	0.4		$V_{GS} = 10 \text{ V}$, $I_D = 7.0 \text{ A}$
$R_{DS(on)}$ Static Drain-Source On-State Resistance ¹		0.66	0.88		$V_{GS} = 10 \text{ V}$, $I_D = 7.0 \text{ A}$ $T_C = 125^\circ \text{C}$

DYNAMIC

g_{fs} Forward Transductance ¹	5.0	7.5		S (M)	$V_{DS} = 2 V_{DS(on)}$, $I_D = 7.0 \text{ A}$
C_{iss} Input Capacitance		2600		pF	$V_{GS} = 0$
C_{oss} Output Capacitance		280		pF	$V_{DS} = 25 \text{ V}$
C_{rss} Reverse Transfer Capacitance		40		pF	$f = 1 \text{ MHz}$
$t_{d(on)}$ Turn-On Delay Time		30		ns	$V_{DS} = 210 \text{ V}$, $I_D @ 7.0 \text{ A}$
t_r Rise Time		46		ns	$R_g = 5.0 \text{ W}$, $V_G = 10 \text{ V}$
$t_{d(off)}$ Turn-Off Delay Time		75		ns	
t_f Fall Time		31		ns	

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

I_S Continuous Source Current (Body Diode)			- 13	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier.
I_{SM} Source Current ¹ (Body Diode)			- 52	A	
V_{SD} Diode Forward Voltage ¹			- 1.4	V	$T_C = 25^\circ \text{C}$, $I_S = -13 \text{ A}$, $V_{GS} = 0$
t_{rr} Reverse Recovery Time		400		ns	$T_J = 150^\circ \text{C}$, $I_R = I_S$, $di/dt = 100 \text{ A/ms}$

1 Pulse Test: Pulse Width 300msec, Duty Cycle 2%.

POWER RECTIFIER CHARACTERISTICS

PIV	Max. Reverse Current		Max. Forward Voltage		*Max. Reverse Recovery Time
	$T_J = 25^\circ\text{C}$	$T_J = 125^\circ\text{C}$	$T_J = 25^\circ\text{C}$	$T_J = 125^\circ\text{C}$	
500 V	20 μA	1.0 mA	1.55 V @ 8 Amp	1.40 V @ 8 Amp	50 nsec

*Measured in circuit, $I_F = .5 \text{ A}$, $I_R = 1 \text{ A}$, $I_{REC} = .250 \text{ A}$.

OM9001SS - OM9004SS

MOSFET ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

Parameter		OM9001SS	OM9002SS	OM9003SS	OM9004SS	Units
V _{DS}	Drain-Source Voltage	100	200	400	500	V
V _{DGR}	Drain-Gate Voltage (R _{GS} = 1 M)	100	200	400	500	V
I _D @ T _C = 25°C	Continuous Drain Current ²	±30	±25	±15	±13	A
I _D @ T _C = 100°C	Continuous Drain Current ²	±20	±16	±9	±8	A
I _{DM}	Pulsed Drain Current ¹	±140	±100	±60	±52	A
V _{GS}	Gate-Source Voltage (Clamped Gate)	±16	±16	±16	±16	V
P _D @ T _C = 25°C	Maximum Power Dissipation	125	125	125	125	W
P _D @ T _C = 100°C	Maximum Power Dissipation	50	50	50	50	W
Junction-To-Case	Linear Derating Factor ¹	1.0	1.0	1.0	1.0	W/°C
Junction-To-Ambient	Linear Derating Factor	.026	.026	.026	.026	W/°C
T _J	Operating and					
T _{stg}	Storage Temperature Range	-55 to 150	-55 to 150	-55 to 150	-55 to 150	°C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	300	300	°C

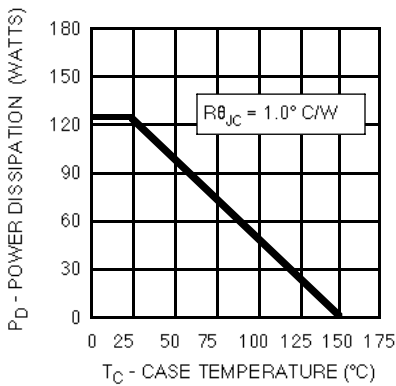
1 Pulse Test: Pulse width 300 μsec. Duty Cycle 2%.

2 Package PIN Limitation: = 35 Amps

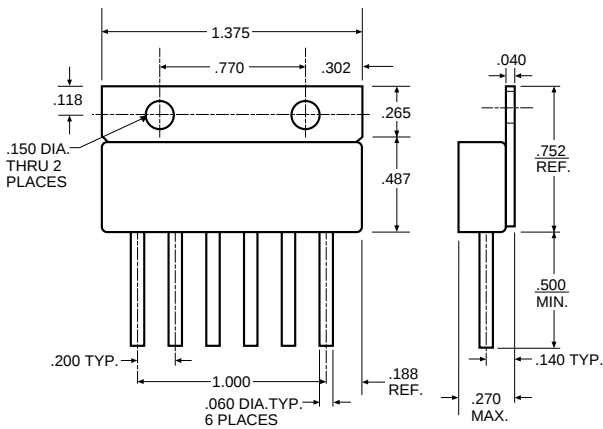
THERMAL RESISTANCE

		MOSFET	RECTIFIER
R _{thJC}	Junction-to-Case	1.0°C/W	1.2°C/W
R _{thJA}	Junction-to-Ambient	40°C/W	40°C/W

POWER DERATING (MOSFET)



MECHANICAL OUTLINE



Unless otherwise specified, the general tolerance is ±.010.