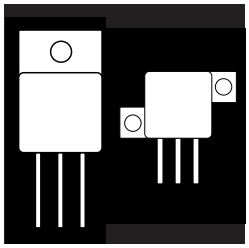
POWER MOSFETS IN HERMETIC ISOLATED TO-254AA PACKAGE



100V Thru 500V, Up To 22 Amp, N-Channel MOSFET In Hermetic Metal Package, With Optional Zener Gate Clamp Protection

FEATURES

- Isolated Hermetic Metal Package
- Fast Switching
- Low $R_{DS(on)}$
- Available Hi-Rel Screened To MIL-S-19500, TX, TXV And S Levels
- Bi-Lateral Zener Gate Protection (Optional)
- Ceramic Feedthroughs Available

DESCRIPTION

This series of hermetically packaged products feature the latest advanced MOSFET and packaging technology. They are ideally suited for Military requirements where small size, high performance and high reliability are required, and in applications such as switching power supplies, motor controls, inverters, choppers, audio amplifiers and high energy pulse circuits. The MOSFET gates are protected using bi-lateral zeners in the OM6109SA series.

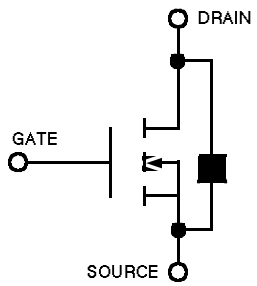
MAXIMUM RATINGS

PART NUMBER	V_{DS}	$R_{DS(ON)}$	$I_{D(MAX)}$
OM6009SA, OM6109SA	100V	.095	22A
OM6010SA, OM6110SA	200V	.18	18A
OM6011SA, OM6111SA	400V	.55	10A
OM6012SA, OM6112SA	500V	.85	8A

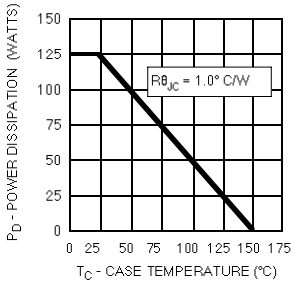
Note: OM61XX Series include gate protection circuitry.

3.1

SCHEMATIC



POWER RATING



Omnirel

ELECTRICAL CHARACTERISTICS: T_C = 25° unless otherwise noted
STATIC P/N OM6009SA / OM6109SA

Parameter		Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	100			V	V_{GS} = 0, I_D = 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			100	nA	V_{GS} = 20 V
I_{GSSR}	Gate-Body Leakage Reverse			-100	nA	V_{GS} = - 20 V
I_{GSS}	Gate-Body Leakage (OM6109)			± 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]	22			A	V_{DS} 2 $V_{DS(on)}$, V_{GS} = 10 V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]		1.275	1.425	V	V_{GS} = 10 V, I_D = 15 A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]		.085	.095		V_{GS} = 10 V, I_D = 15 A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]		.130	.155		V_{GS} = 10 V, I_D = 15 A, T_C = 125 C

DYNAMIC

g_{fs}	Forward Transductance[1]	10.0			S (℧)	V_{DS} 2 $V_{DS(on)}$, I_D = 15 A
C_{iss}	Input Capacitance		1275		pF	V_{GS} = 0
C_{oss}	Output Capacitance		550		pF	V_{DS} = 25 V
C_{rss}	Reverse Transfer Capacitance		160		pF	f = 1 MHz
$T_{d(on)}$	Turn-On Delay Time		16		ns	V_{DD} = 30 V, I_D = 5 A
t_r	Rise Time		19		ns	R_g = 5 W, V_{GS} = 10 V
$T_{d(off)}$	Turn-Off Delay Time		42		ns	(MOSFET) switching times are essentially independent of operating temperature.
t_f	Fall Time		24		ns	

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

I_S	Continuous Source Current (Body Diode)			- 27	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier.
I_{SM}	Source Current[1] (Body Diode)			- 108	A	
V_{SD}	Diode Forward Voltage[1]			- 2.5	V	T_C = 25 C, I_S = -24 A, V_{GS} = 0
t_{rr}	Reverse Recovery Time		200		ns	T_J = 150 C, $I_F = I_S$, dI_F/ds = 100 A/ms

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

ELECTRICAL CHARACTERISTICS: T_C = 25° unless otherwise noted
STATIC P/N OM6010SA / OM6110SA

Parameter		Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	200			V	V_{GS} = 0, I_D = 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			100	nA	V_{GS} = 20 V
I_{GSSR}	Gate-Body Leakage Reverse			- 100	nA	V_{GS} = - 20 V
I_{GSS}	Gate-Body Leakage (OM6110)			± 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]	18			A	V_{DS} 2 $V_{DS(on)}$, V_{GS} = 10 V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]		1.4	1.8	V	V_{GS} = 10 V, I_D = 10 A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]		0.14	0.18		V_{GS} = 10 V, I_D = 10 A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]		0.28	0.36		V_{GS} = 10 V, I_D = 10 A, T_C = 125 C

DYNAMIC

g_{fs}	Forward Transductance[1]	6.0			S (℧)	V_{DS} 2 $V_{DS(on)}$, I_D = 10 A
C_{iss}	Input Capacitance		1000		pF	V_{GS} = 0
C_{oss}	Output Capacitance		250		pF	V_{DS} = 25 V
C_{rss}	Reverse Transfer Capacitance		100		pF	f = 1 MHz
$T_{d(on)}$	Turn-On Delay Time		17		ns	V_{DD} = 75 V, I_D @ 18 A
t_r	Rise Time		52		ns	R_g = 5 W, V_{GS} = 10 V
$T_{d(off)}$	Turn-Off Delay Time		36		ns	(MOSFET) switching times are essentially independent of operating temperature.
t_f	Fall Time		30		ns	

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

I_S	Continuous Source Current (Body Diode)			- 18	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier.
I_{SM}	Source Current[1] (Body Diode)			- 72	A	
V_{SD}	Diode Forward Voltage[1]			- 2	V	T_C = 25 C, I_S = -18 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%.

ELECTRICAL CHARACTERISTICS: T_C = 25° unless otherwise noted
STATIC P/N OM6011SA / OM6111SA

Parameter		Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	400			V	V_{GS} = 0, I_D = 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			100	nA	V_{GS} = 20 V
I_{GSSR}	Gate-Body Leakage Reverse			-100	nA	V_{GS} = - 20 V
I_{GSS}	Gate-Body Leakage (OM6111)			± 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]	10			A	V_{DS} 2 $V_{DS(on)}$, V_{GS} = 10 V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]		2.35	2.75	V	V_{GS} = 10 V, I_D = 5 A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]		0.47	0.55		V_{GS} = 10 V, I_D = 5 A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]		0.93	1.10		V_{GS} = 10 V, I_D = 5 A, T_C = 125 C

DYNAMIC

g_{fs}	Forward Transductance[1]	4.0			S (M)	V_{DS} 2 $V_{DS(on)}$, I_D = 5 A
C_{iss}	Input Capacitance		1150		pF	V_{GS} = 0
C_{oss}	Output Capacitance		165		pF	V_{DS} = 25 V
C_{rss}	Reverse Transfer Capacitance		70		pF	f = 1 MHz
$T_{d(on)}$	Turn-On Delay Time		17		ns	V_{DD} = 175 V, I_D @ 5 A
t_r	Rise Time		12		ns	R_g = 5 W, V_{GS} = 10 V
$T_{d(off)}$	Turn-Off Delay Time		45		ns	(MOSFET) switching times are essentially independent of operating temperature.
t_f	Fall Time		30		ns	

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

I_S	Continuous Source Current (Body Diode)			- 10	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier.
I_{SM}	Source Current[1] (Body Diode)			- 40	A	
V_{SD}	Diode Forward Voltage[1]			- 2	V	T_C = 25 C, I_S = -10 A, V_{GS} = 0
t_{rr}	Reverse Recovery Time		530		ns	T_J = 150 C, I_F = I_S, dI_F/ds = 100 A/ms

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

ELECTRICAL CHARACTERISTICS: T_C = 25° unless otherwise noted
STATIC P/N OM6012SA / OM6112SA

Parameter		Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	500			V	V_{GS} = 0, I_D = 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			100	nA	V_{GS} = 20 V
I_{GSSR}	Gate-Body Leakage Reverse			- 100	nA	V_{GS} = - 20 V
I_{GSS}	Gate-Body Leakage (OM6112)			± 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]	8.0			A	V_{DS} 2 $V_{DS(on)}$, V_{GS} = 10 V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]		3.2	3.4	V	V_{GS} = 10 V, I_D = 4 A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]		0.8	0.85		V_{GS} = 10 V, I_D = 4 A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]		1.50	1.65		V_{GS} = 10 V, I_D = 4 A, T_C = 125 C

DYNAMIC

g_{fs}	Forward Transductance[1]	4.0			S (M)	V_{DS} 2 $V_{DS(on)}$, I_D = 4 A
C_{iss}	Input Capacitance		1275		pF	V_{GS} = 0
C_{oss}	Output Capacitance		200		pF	V_{DS} = 25 V
C_{rss}	Reverse Transfer Capacitance		85		pF	f = 1 MHz
$T_{d(on)}$	Turn-On Delay Time		17		ns	V_{DD} = 200 V, I_D = 4 A
t_r	Rise Time		5		ns	R_g = 5 W, V_{GS} = 10 V
$T_{d(off)}$	Turn-Off Delay Time		42		ns	(MOSFET) switching times are essentially independent of operating temperature.
t_f	Fall Time		14		ns	

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

I_S	Continuous Source Current (Body Diode)			- 8	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier.
I_{SM}	Source Current[1] (Body Diode)			- 32	A	
V_{SD}	Diode Forward Voltage[1]			- 2	V	T_C = 25 C, I_S = -18 A, V_{GS} = 0
t_{rr}	Reverse Recovery Time		700		ns	T_J = 150 C, I_F = I_S, dI_F/ds = 100 A/ms

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

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

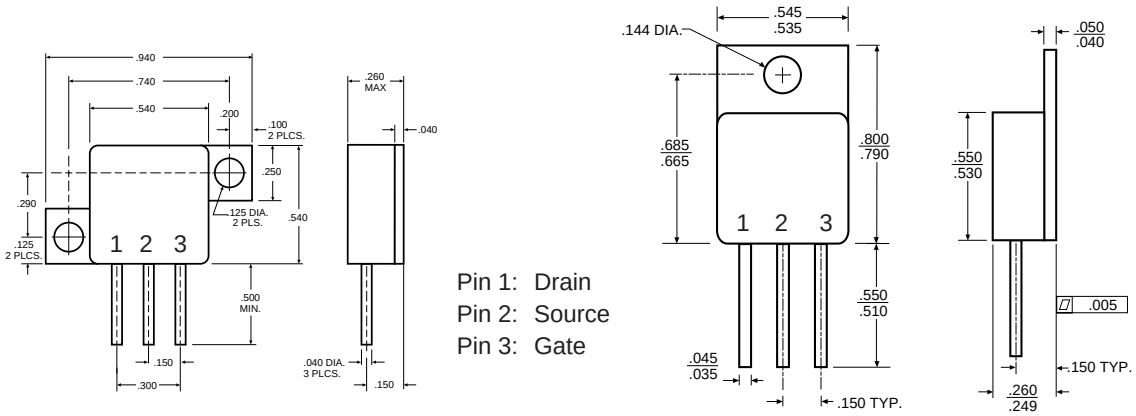
	Parameter	OM6009 OM6109	OM6010 OM6110	OM6011 OM6111	OM6012 OM6112	Units
V_{DS}	Drain-Source Voltage	100	200	400	500	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 M)	100	200	400	500	V
I_D @ T_C = 25°C	Continuous Drain Current [2]	± 22	± 18	± 10	± 8	A
I_D @ T_C = 100°C	Continuous Drain Current [2]	± 17	± 11	± 6	± 5	A
I_{DM}	Pulsed Drain Current[1]	± 88	± 72	± 40	± 32	A
V_{GS}	Gate-Source Volt. (Unclamped Gate)	± 20	± 20	± 20	± 20	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	1.0	1.0	1.0	1.0	W/°C
Junction To Ambient	Linear Derating Factor	.020	.020	.020	.020	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 = 25 Amps

THERMAL RESISTANCE

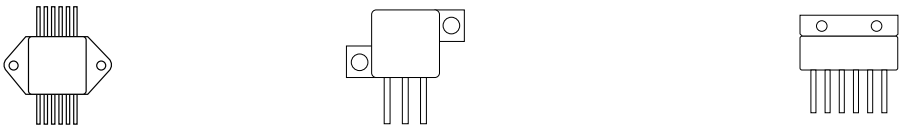
R_{thJC}	Junction-to-Case	1.0	°C/W	
R_{thJA}	Junction-to-Ambient	50	°C/W	Free Air Operation

MECHANICAL OUTLINE



Pin 1: Drain
Pin 2: Source
Pin 3: Gate

PACKAGE OPTIONS



MOD PAK | Z-TAB | 6 PIN SIP

NOTE: Standard Products are supplied with glass feedthroughs. For ceramic feedthroughs, add the letter "C" to the part number.
Example - OMXXXXCSA MOSFETs are also available in Z-Tab, dual and quad pak styles - Please call the factory for more information.

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