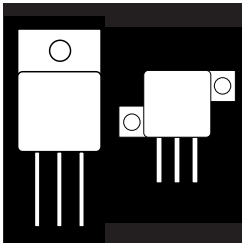


OM6009SA OM6011SA OM6109SA OM6111SA  
 OM6010SA OM6012SA OM6110SA OM6112SA

# 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.

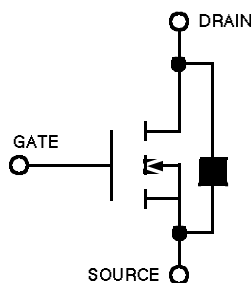
## MAXIMUM RATINGS

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

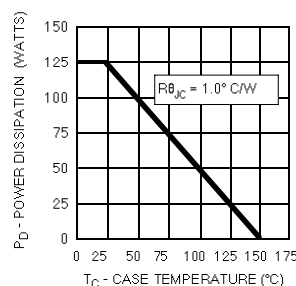
Note: OM61XX Series include gate protection circuitry.

3.1

## SCHEMATIC



## POWER RATING



**ELECTRICAL CHARACTERISTICS:  $T_C = 25^\circ$  unless otherwise noted  
STATIC P/N OM6009SA / OM6109SA**

Parameter	Min.	Typ.	Max.	Units	Test Conditions
$BV_{DSS}$ Drain-Source Breakdown Voltage	100			V	$V_{GS} = 0, I_D = 250 \text{ mA}$
$V_{GS(th)}$ Gate-Threshold Voltage	2.0	4.0		V	$V_{DS} = V_{GS}, I_D = 250 \text{ mA}$
$I_{GSSF}$ Gate-Body Leakage Forward			100	nA	$V_{GS} = 20 \text{ V}$
$I_{GSSR}$ Gate-Body Leakage Reverse			-100	nA	$V_{GS} = -20 \text{ V}$
$I_{GSS}$ Gate-Body Leakage (OM6109)			$\pm 500$	nA	$V_{GS} = \pm 12.8 \text{ V}$
$I_{DSS}$ 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 <sup>1</sup>	22			A	$V_{DS} = 2 V_{DS(on)}, V_{GS} = 10 \text{ V}$
$V_{DS(on)}$ Static Drain-Source On-State Voltage <sup>1</sup>		1.275	1.425	V	$V_{GS} = 10 \text{ V}, I_D = 15 \text{ A}$
$R_{DS(on)}$ Static Drain-Source On-State Resistance <sup>1</sup>		.085	.095		$V_{GS} = 10 \text{ V}, I_D = 15 \text{ A}$
$R_{DS(on)}$ Static Drain-Source On-State Resistance <sup>1</sup>		.130	.155		$V_{GS} = 10 \text{ V}, I_D = 15 \text{ A}, T_C = 125 \text{ C}$

**DYNAMIC**

Parameter	Min.	Typ.	Max.	Units	Test Conditions
$g_{fs}$ Forward Transconductance <sup>1</sup>	10.0			S (M)	$V_{DS} = 2 V_{DS(on)}, I_D = 15 \text{ A}$
$C_{iss}$ Input Capacitance		1275		pF	$V_{GS} = 0$
$C_{oss}$ Output Capacitance		550		pF	$V_{DS} = 25 \text{ V}$
$C_{rss}$ Reverse Transfer Capacitance		160		pF	$f = 1 \text{ MHz}$
$T_{d(on)}$ Turn-On Delay Time		16		ns	$V_{DS} = 30 \text{ V}, I_D = 5 \text{ A}$
$t_r$ Rise Time		19		ns	$R_{\theta} = 5 \text{ W}, V_{GS} = 10 \text{ V}$
$T_{d(off)}$ 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**

Parameter	Min.	Typ.	Max.	Units	Test Conditions
$I_S$ Continuous Source Current (Body Diode)			-27	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier.
$I_{SM}$ Source Current <sup>1</sup> (Body Diode)			-108	A	
$V_{SD}$ Diode Forward Voltage <sup>1</sup>			-2.5	V	$T_C = 25 \text{ C}, I_S = -24 \text{ A}, V_{GS} = 0$
$t_{rr}$ Reverse Recovery Time		200		ns	$T_J = 150 \text{ C}, I_F = I_S, di_F/ds = 100 \text{ A/ms}$

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

**ELECTRICAL CHARACTERISTICS:  $T_C = 25^\circ$  unless otherwise noted  
STATIC P/N OM6010SA / OM6110SA**

Parameter	Min.	Typ.	Max.	Units	Test Conditions
$BV_{DSS}$ Drain-Source Breakdown Voltage	200			V	$V_{GS} = 0, I_D = 250 \text{ mA}$
$V_{GS(th)}$ Gate-Threshold Voltage	2.0	4.0		V	$V_{DS} = V_{GS}, I_D = 250 \text{ mA}$
$I_{GSSF}$ Gate-Body Leakage Forward			100	nA	$V_{GS} = 20 \text{ V}$
$I_{GSSR}$ Gate-Body Leakage Reverse			-100	nA	$V_{GS} = -20 \text{ V}$
$I_{GSS}$ Gate-Body Leakage (OM6110)			$\pm 500$	nA	$V_{GS} = \pm 12.8 \text{ V}$
$I_{DSS}$ 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 <sup>1</sup>	18			A	$V_{DS} = 2 V_{DS(on)}, V_{GS} = 10 \text{ V}$
$V_{DS(on)}$ Static Drain-Source On-State Voltage <sup>1</sup>		1.4	1.8	V	$V_{GS} = 10 \text{ V}, I_D = 10 \text{ A}$
$R_{DS(on)}$ Static Drain-Source On-State Resistance <sup>1</sup>		0.14	0.18		$V_{GS} = 10 \text{ V}, I_D = 10 \text{ A}$
$R_{DS(on)}$ Static Drain-Source On-State Resistance <sup>1</sup>		0.28	0.36		$V_{GS} = 10 \text{ V}, I_D = 10 \text{ A}, T_C = 125 \text{ C}$

**DYNAMIC**

Parameter	Min.	Typ.	Max.	Units	Test Conditions
$g_{fs}$ Forward Transconductance <sup>1</sup>	6.0			S (M)	$V_{DS} = 2 V_{DS(on)}, I_D = 10 \text{ A}$
$C_{iss}$ Input Capacitance		1000		pF	$V_{GS} = 0$
$C_{oss}$ Output Capacitance		250		pF	$V_{DS} = 25 \text{ V}$
$C_{rss}$ Reverse Transfer Capacitance		100		pF	$f = 1 \text{ MHz}$
$T_{d(on)}$ Turn-On Delay Time		17		ns	$V_{DS} = 75 \text{ V}, I_D @ 18 \text{ A}$
$t_r$ Rise Time		52		ns	$R_{\theta} = 5 \text{ W}, V_{GS} = 10 \text{ V}$
$T_{d(off)}$ 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**

Parameter	Min.	Typ.	Max.	Units	Test Conditions
$I_S$ Continuous Source Current (Body Diode)			-18	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier.
$I_{SM}$ Source Current <sup>1</sup> (Body Diode)			-72	A	
$V_{SD}$ Diode Forward Voltage <sup>1</sup>			-2	V	$T_C = 25 \text{ C}, I_S = -18 \text{ A}, V_{GS} = 0$
$t_{rr}$ Reverse Recovery Time		350		ns	$T_J = 150 \text{ C}, I_F = I_S, di_F/ds = 100 \text{ A/ms}$

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

**ELECTRICAL CHARACTERISTICS:  $T_C = 25^\circ$  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)		$\pm 500$		nA	$V_{GS} = \pm 12.8$ V
$I_{DSS}$ Zero Gate Voltage Drain Current	0.1	0.25		mA	$V_{DS} = \text{Max. Rat.}$ , $V_{GS} = 0$
	0.2	1.0		mA	$V_{DS} = 0.8$ Max. Rat., $V_{GS} = 0$ , $T_C = 125^\circ$ C
$I_{D(on)}$ On-State Drain Current <sup>1</sup>	10			A	$V_{DS} = 2 V_{DS(on)}$ , $V_{GS} = 10$ V
$V_{DS(on)}$ Static Drain-Source On-State Voltage <sup>1</sup>	2.35	2.75		V	$V_{GS} = 10$ V, $I_D = 5$ A
$R_{DS(on)}$ Static Drain-Source On-State Resistance <sup>1</sup>	0.47	0.55			$V_{GS} = 10$ V, $I_D = 5$ A
$R_{DS(on)}$ Static Drain-Source On-State Resistance <sup>1</sup>	0.93	1.10			$V_{GS} = 10$ V, $I_D = 5$ A, $T_C = 125$ C

**DYNAMIC**

$g_{fs}$ Forward Transconductance <sup>1</sup>	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	$V_{DS} = 175$ V, $I_D @ 5$ A
$t_r$ Rise Time	12			ns	$R_{\theta} = 5$ 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	(MOSFET) switching times are essentially independent of operating temperature.

**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 <sup>1</sup> (Body Diode)			- 40	A	
$V_{SD}$ Diode Forward Voltage <sup>1</sup>			- 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 300ms, Duty Cycle 2%.

**ELECTRICAL CHARACTERISTICS:  $T_C = 25^\circ$  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)		$\pm 500$		nA	$V_{GS} = \pm 12.8$ V
$I_{DSS}$ Zero Gate Voltage Drain Current	0.1	0.25		mA	$V_{DS} = \text{Max. Rat.}$ , $V_{GS} = 0$
	0.2	1.0		mA	$V_{DS} = 0.8$ Max. Rat., $V_{GS} = 0$ , $T_C = 125^\circ$ C
$I_{D(on)}$ On-State Drain Current <sup>1</sup>	8.0			A	$V_{DS} = 2 V_{DS(on)}$ , $V_{GS} = 10$ V
$V_{DS(on)}$ Static Drain-Source On-State Voltage <sup>1</sup>	3.2	3.4		V	$V_{GS} = 10$ V, $I_D = 4$ A
$R_{DS(on)}$ Static Drain-Source On-State Resistance <sup>1</sup>	0.8	0.85			$V_{GS} = 10$ V, $I_D = 4$ A
$R_{DS(on)}$ Static Drain-Source On-State Resistance <sup>1</sup>	1.50	1.65			$V_{GS} = 10$ V, $I_D = 4$ A, $T_C = 125$ C

**DYNAMIC**

$g_{fs}$ Forward Transconductance <sup>1</sup>	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	$V_{DS} = 200$ V, $I_D = 4$ A
$t_r$ Rise Time	5			ns	$R_{\theta} = 5$ 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	(MOSFET) switching times are essentially independent of operating temperature.

**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 <sup>1</sup> (Body Diode)			- 32	A	
$V_{SD}$ Diode Forward Voltage <sup>1</sup>			- 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

## OM6009SA - OM6112SA

### ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

Parameter	OM6009 OM6109	OM6010 OM6110	OM6011 OM6111	OM6012 OM6112	Units
$V_{DS}$	100	200	400	500	V
$V_{DGR}$	100	200	400	500	V
$I_D @ T_C = 25^\circ\text{C}$	$\pm 22$	$\pm 18$	$\pm 10$	$\pm 8$	A
$I_D @ T_C = 100^\circ\text{C}$	$\pm 17$	$\pm 11$	$\pm 6$	$\pm 5$	A
$I_{DM}$	$\pm 88$	$\pm 72$	$\pm 40$	$\pm 32$	A
$V_{GS}$	$\pm 20$	$\pm 20$	$\pm 20$	$\pm 20$	V
$P_D @ T_C = 25^\circ\text{C}$	125	125	125	125	W
$P_D @ T_C = 100^\circ\text{C}$	50	50	50	50	W
Junction To Case	1.0	1.0	1.0	1.0	$W/^\circ\text{C}$
Junction To Ambient	.020	.020	.020	.020	$W/^\circ\text{C}$
$T_J$	Operating and				
$T_{stg}$	Storage Temperature Range				
Lead Temperature	-55 to 150	-55 to 150	-55 to 150	-55 to 150	$^\circ\text{C}$
	300	300	300	300	$^\circ\text{C}$

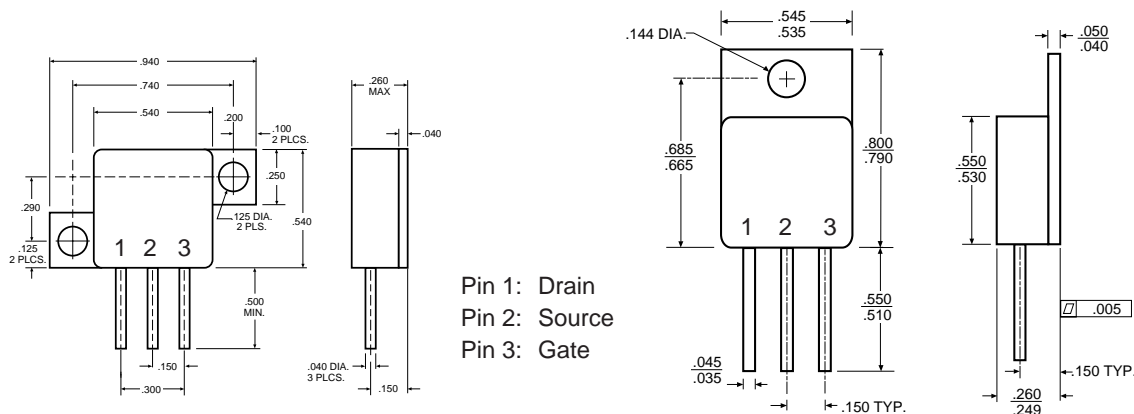
1 Pulse Test: Pulse width 300  $\mu\text{sec}$ . Duty Cycle 2%.

2 Package Pin Limitation = 25 Amps

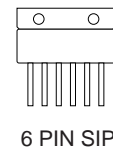
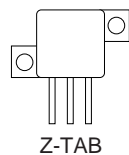
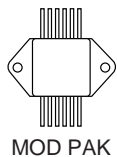
### THERMAL RESISTANCE

$R_{thJC}$	Junction-to-Case	1.0	$^\circ\text{C/W}$	
$R_{thJA}$	Junction-to-Ambient	50	$^\circ\text{C/W}$	Free Air Operation

### MECHANICAL OUTLINE



### PACKAGE OPTIONS



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.