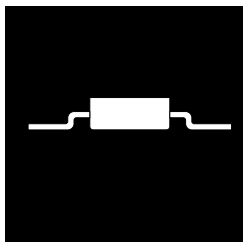


# POWER MOSFET IN HERMETIC ISOLATED SURFACE MOUNT PACKAGE



**100V Thru 500V, Up To 10 Amp,  
N-Channel Power MOSFETs In A  
Hermetic Surface Mount Package**

## FEATURES

- Isolated Hermetic Metal Package
- Fast Switching, Low Drive Current
- Ease of Paralleling For Added Power
- Low  $R_{DS(on)}$
- Available Screened To MIL-S-19500, TX, TXV and S Levels

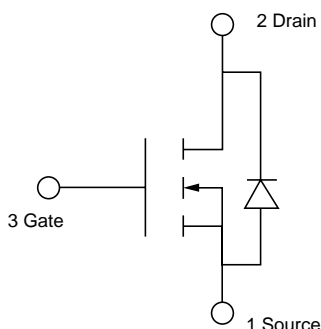
## DESCRIPTION

This series of hermetically packaged surface mount 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 surface mount applications such as switching power supplies, motor controls, inverters, choppers, audio amplifiers and high energy pulse circuits.

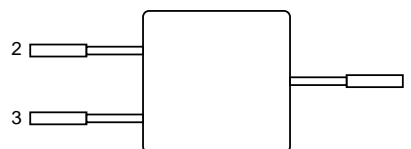
## MAXIMUM RATINGS @ $T_C = 25^\circ C$

PART NUMBER	$V_{DS}$	$R_{DS(on)}$	$I_D$
OM6038SM	100V	.20	14A
OM6039SM	200V	.44	9A
OM6040SM	400V	1.05	5A
OM6041SM	500V	1.60	4A

## SCHEMATIC



## PIN CONNECTION



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

3.5

**ELECTRICAL CHARACTERISTICS: (T<sub>C</sub> = 25°C unless otherwise noted)  
STATIC P/N OM6101ST / OM6038SM (100V)**

Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV <sub>DSS</sub> Drain-Source Breakdown Voltage	100			V	V <sub>GS</sub> = 0, I <sub>b</sub> = 250 μA
V <sub>GS(th)</sub> Gate-Threshold Voltage	2.0		4.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>b</sub> = 250 μA
I <sub>GSS</sub> Gate-Body Leakage		± 500		nA	V <sub>GS</sub> = ± 12.8 V
I <sub>BSS</sub> Gate-Body Leakage		± 100		nA	V <sub>GS</sub> = ± 20 V
I <sub>DSS</sub> Zero Gate Voltage Drain Current		0.1	0.25	mA	V <sub>DS</sub> = Max. Rat., V <sub>GS</sub> = 0
		0.2	1.0	mA	V <sub>DS</sub> = 0.8 Max. Rat., V <sub>GS</sub> = 0, T <sub>C</sub> = 125°C
I <sub>D(on)</sub> On-State Drain Current <sup>1</sup>	14			A	V <sub>DS</sub> = 2 V <sub>DSS(on)</sub> , V <sub>GS</sub> = 10 V
V <sub>DS(on)</sub> Static Drain-Source On-State Voltage <sup>1</sup>		1.2	1.60	V	V <sub>GS</sub> = 10 V, I <sub>b</sub> = 8 A
R <sub>DS(on)</sub> Static Drain-Source On-State Resistance <sup>1</sup>		0.20			V <sub>GS</sub> = 10 V, I <sub>b</sub> = 8 A
R <sub>DS(on)</sub> Static Drain-Source On-State Resistance <sup>1</sup>		0.40			V <sub>GS</sub> = 10 V, I <sub>b</sub> = 8 A, T <sub>C</sub> = 125°C

**DYNAMIC**

g <sub>fs</sub> Forward Transconductance <sup>1</sup>	4.0			S(t)	V <sub>DS</sub> = 2 V <sub>DSS(on)</sub> , I <sub>b</sub> = 8 A
C <sub>iss</sub> Input Capacitance	750			pF	V <sub>GS</sub> = 0
C <sub>oss</sub> Output Capacitance	250			pF	V <sub>DS</sub> = 25 V
C <sub>rss</sub> Reverse Transfer Capacitance	100			pF	f = 1 MHz
t <sub>turn(on)</sub> Turn-On Delay Time	15			ns	V <sub>DD</sub> = 30V, I <sub>b</sub> ≅ 8 A
t <sub>r</sub> Rise Time	35			ns	R <sub>θ</sub> = 7.5 Ω, V <sub>DS</sub> = 10 V
t <sub>turn(off)</sub> Turn-Off Delay Time	38			ns	
t <sub>f</sub> Fall Time	23			ns	

**BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS**

I <sub>S</sub> Continuous Source Current (Body Diode)	-14			A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier.
I <sub>SM</sub> Source Current <sup>1</sup> (Body Diode)	-56			A	
V <sub>SD</sub> Diode Forward Voltage <sup>1</sup>	-2.5			V	T <sub>C</sub> = 25°C, I <sub>S</sub> = -14 A, V <sub>GS</sub> = 0
t <sub>r</sub> Reverse Recovery Time	100			ns	T <sub>C</sub> = 25°C, I <sub>S</sub> = -12 A, V <sub>GS</sub> = 0
					T <sub>J</sub> = 150°C, I <sub>r</sub> = I <sub>S</sub> , dI <sub>r</sub> /ds = 100 A/μs

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

**ELECTRICAL CHARACTERISTICS: (T<sub>C</sub> = 25°C unless otherwise noted)  
STATIC P/N OM6039SM (200V)**

Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV <sub>DSS</sub> Drain-Source Breakdown Voltage	200			V	V <sub>GS</sub> = 0, I <sub>b</sub> = 250 μA
V <sub>GS(th)</sub> Gate-Threshold Voltage	2.0		4.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>b</sub> = 250 μA
I <sub>GSS</sub> Gate-Body Leakage		± 500		nA	V <sub>GS</sub> = ± 12.8 V
I <sub>BSS</sub> Gate-Body Leakage		± 100		nA	V <sub>GS</sub> = ± 20 V
I <sub>DSS</sub> Zero Gate Voltage Drain Current		0.1	0.25	mA	V <sub>DS</sub> = Max. Rat., V <sub>GS</sub> = 0
		0.2	1.0	mA	V <sub>DS</sub> = 0.8 Max. Rat., V <sub>GS</sub> = 0, T <sub>C</sub> = 125°C
I <sub>D(on)</sub> On-State Drain Current <sup>1</sup>	9.0			A	V <sub>DS</sub> = 2 V <sub>DSS(on)</sub> , V <sub>GS</sub> = 10 V
V <sub>DS(on)</sub> Static Drain-Source On-State Voltage <sup>1</sup>		1.25	2.2	V	V <sub>GS</sub> = 10 V, I <sub>b</sub> = 5.0 A
R <sub>DS(on)</sub> Static Drain-Source On-State Resistance <sup>1</sup>		0.44			V <sub>GS</sub> = 10 V, I <sub>b</sub> = 5.0 A
R <sub>DS(on)</sub> Static Drain-Source On-State Resistance <sup>1</sup>		0.88			V <sub>GS</sub> = 10 V, I <sub>b</sub> = 5.0 A, T <sub>C</sub> = 125°C

**DYNAMIC**

g <sub>fs</sub> Forward Transconductance <sup>1</sup>	3.0	5.8		S(t)	V <sub>DS</sub> = 2 V <sub>DSS(on)</sub> , I <sub>b</sub> = 5.0 A
C <sub>iss</sub> Input Capacitance	780			pF	V <sub>GS</sub> = 0
C <sub>oss</sub> Output Capacitance	150			pF	V <sub>DS</sub> = 25 V
C <sub>rss</sub> Reverse Transfer Capacitance	55			pF	f = 1 MHz
t <sub>turn(on)</sub> Turn-On Delay Time	9			ns	V <sub>DD</sub> = 75V, I <sub>b</sub> ≅ 5.0 A
t <sub>r</sub> Rise Time	18			ns	R <sub>θ</sub> = 7.5 Ω, V <sub>DS</sub> = 10 V
t <sub>turn(off)</sub> Turn-Off Delay Time	45			ns	
t <sub>f</sub> Fall Time	27			ns	

**BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS**

I <sub>S</sub> Continuous Source Current (Body Diode)	-9			A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier.
I <sub>SM</sub> Source Current <sup>1</sup> (Body Diode)	-36			A	
V <sub>SD</sub> Diode Forward Voltage <sup>1</sup>	-2			V	T <sub>C</sub> = 25°C, I <sub>S</sub> = -9 A, V <sub>GS</sub> = 0
t <sub>r</sub> Reverse Recovery Time	250			ns	T <sub>C</sub> = 25°C, I <sub>S</sub> = -8 A, V <sub>GS</sub> = 0
					T <sub>J</sub> = 150°C, I <sub>r</sub> = I <sub>S</sub> , dI <sub>r</sub> /ds = 100 A/μs

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

**ELECTRICAL CHARACTERISTICS: (T<sub>C</sub> = 25°C unless otherwise noted)  
STATIC P/N OM6103ST / OM6040SM (400V)**

Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV <sub>DSS</sub> Drain-Source Breakdown Voltage	400			V	V <sub>GS</sub> = 0, I <sub>b</sub> = 250 μA
V <sub>GS(th)</sub> Gate-Threshold Voltage	2.0	4.0	4.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>b</sub> = 250 μA
I <sub>GSS</sub> Gate-Body Leakage (OM6103)		± 500	± 500	nA	V <sub>GS</sub> = ± 12.8 V
I <sub>GSS</sub> Gate-Body Leakage (OM6003)		± 100	± 100	nA	V <sub>GS</sub> = ± 20 V
I <sub>BSS</sub> Zero Gate Voltage Drain Current		0.1	0.25	mA	V <sub>DS</sub> = Max. Rat., V <sub>GS</sub> = 0, T <sub>C</sub> = 125° C
		0.2	1.0	mA	
I <sub>D(on)</sub> On-State Drain Current <sup>1</sup>	5.5			A	V <sub>DS</sub> = 2 V <sub>DS(on)</sub> , V <sub>GS</sub> = 10 V
V <sub>DS(on)</sub> Static Drain-Source On-State Voltage <sup>1</sup>	2.4	3.15	3.15	V	V <sub>GS</sub> = 10 V, I <sub>b</sub> = 3.0 A
R <sub>DS(on)</sub> Static Drain-Source On-State Resistance <sup>1</sup>	1.05				V <sub>GS</sub> = 10 V, I <sub>b</sub> = 3.0 A
R <sub>DS(on)</sub> Static Drain-Source On-State Resistance <sup>1</sup>			2.0		V <sub>GS</sub> = 10 V, I <sub>b</sub> = 3.0 A, T <sub>C</sub> = 125° C

**DYNAMIC**

g <sub>fs</sub> Forward Transconductance <sup>1</sup>	3.0	3.6	S(Ω)	V <sub>DS</sub> = 2 V <sub>DS(on)</sub> , I <sub>b</sub> = 3.0 A
C <sub>iss</sub> Input Capacitance	700		pF	V <sub>GS</sub> = 0
C <sub>oss</sub> Output Capacitance	70		pF	V <sub>DS</sub> = 25 V
C <sub>rss</sub> Reverse Transfer Capacitance	20		pF	f = 1 MHz
t <sub>tr(on)</sub> Turn-On Delay Time	18		ns	V <sub>DD</sub> = 175 V, I <sub>b</sub> = 3.0 A
t <sub>r</sub> Rise Time	20		ns	R <sub>θ</sub> = 10 Ω, V <sub>GS</sub> = 10 V
t <sub>tr(off)</sub> Turn-Off Delay Time	40		ns	
t <sub>f</sub> Fall Time	25		ns	

**BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS**

I <sub>S</sub> Continuous Source Current (Body Diode)	- 5.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier.
I <sub>SM</sub> Source Current <sup>1</sup> (Body Diode)	- 22	A	
V <sub>SD</sub> Diode Forward Voltage <sup>1</sup>	- 1.6	V	T <sub>C</sub> = 25°C, I <sub>S</sub> = -5.5 A, V <sub>GS</sub> = 0 T <sub>C</sub> = 25°C, I <sub>S</sub> = -4.5 A, V <sub>GS</sub> = 0
t <sub>rr</sub> Reverse Recovery Time	470	ns	T <sub>J</sub> = 150°C, I <sub>F</sub> = I <sub>S</sub> , dI <sub>F</sub> /ds = 100 A/μs

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

**ELECTRICAL CHARACTERISTICS: (T<sub>C</sub> = 25°C unless otherwise noted)  
STATIC P/N OM6104ST / OM6041SM (500V)**

Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV <sub>DSS</sub> Drain-Source Breakdown Voltage	500			V	V <sub>GS</sub> = 0, I <sub>b</sub> = 250 μA
V <sub>GS(th)</sub> Gate-Threshold Voltage	2.0	4.0	4.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>b</sub> = 250 μA
I <sub>GSS</sub> Gate-Body Leakage (OM6104)		± 500	± 500	nA	V <sub>GS</sub> = ± 12.8 V
I <sub>GSS</sub> Gate-Body Leakage (OM6004)		± 100	± 100	nA	V <sub>GS</sub> = ± 20 V
I <sub>BSS</sub> Zero Gate Voltage Drain Current		0.1	0.25	mA	V <sub>DS</sub> = Max. Rat., V <sub>GS</sub> = 0, T <sub>C</sub> = 125° C
		0.2	1.0	mA	
I <sub>D(on)</sub> On-State Drain Current <sup>1</sup>	4.5			A	V <sub>DS</sub> = 2 V <sub>DS(on)</sub> , V <sub>GS</sub> = 10 V
V <sub>DS(on)</sub> Static Drain-Source On-State Voltage <sup>1</sup>	3.25	4.00	4.00	V	V <sub>GS</sub> = 10 V, I <sub>b</sub> = 2.5 A
R <sub>DS(on)</sub> Static Drain-Source On-State Resistance <sup>1</sup>			1.6		V <sub>GS</sub> = 10 V, I <sub>b</sub> = 2.5 A
R <sub>DS(on)</sub> Static Drain-Source On-State Resistance <sup>1</sup>			3.3		V <sub>GS</sub> = 10 V, I <sub>b</sub> = 2.5 A, T <sub>C</sub> = 125° C

**DYNAMIC**

g <sub>fs</sub> Forward Transconductance <sup>1</sup>	2.5	2.8	S(Ω)	V <sub>DS</sub> = 2 V <sub>DS(on)</sub> , I <sub>b</sub> = 2.5 A
C <sub>iss</sub> Input Capacitance	700		pF	V <sub>GS</sub> = 0
C <sub>oss</sub> Output Capacitance	90		pF	V <sub>DS</sub> = 25 V
C <sub>rss</sub> Reverse Transfer Capacitance	30		pF	f = 1 MHz
t <sub>tr(on)</sub> Turn-On Delay Time	18		ns	V <sub>DD</sub> = 225 V, I <sub>b</sub> = 2.5 A
t <sub>r</sub> Rise Time	20		ns	R <sub>θ</sub> = 7.5 Ω, V <sub>GS</sub> = 10 V
t <sub>tr(off)</sub> Turn-Off Delay Time	42		ns	
t <sub>f</sub> Fall Time	25		ns	

**BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS**

I <sub>S</sub> Continuous Source Current (Body Diode)	- 4.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier.
I <sub>SM</sub> Source Current <sup>1</sup> (Body Diode)	- 18	A	
V <sub>SD</sub> Diode Forward Voltage <sup>1</sup>	- 1.4	V	T <sub>C</sub> = 25°C, I <sub>S</sub> = -4.5 A, V <sub>GS</sub> = 0 T <sub>C</sub> = 25°C, I <sub>S</sub> = -4 A, V <sub>GS</sub> = 0
t <sub>rr</sub> Reverse Recovery Time	430	ns	T <sub>J</sub> = 150°C, I <sub>F</sub> = I <sub>S</sub> , dI <sub>F</sub> /ds = 100 A/μs

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

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

Parameter	OM6038	OM6039	OM6040	OM6041	Units	
$V_{DS}$	100	200	400	500	V	
$V_{DGR}$	100	200	400	500	V	
$I_D @ T_C = 25^\circ\text{C}$	$\pm 14$	$\pm 9$	$\pm 5$	$\pm 4$	A	
$I_D @ T_C = 100^\circ\text{C}$	$\pm 7$	$\pm 5$	$\pm 3$	$\pm 2$	A	
$I_{DM}$	$\pm 45$	$\pm 35$	$\pm 18$	$\pm 10$	A	
$P_D @ T_C = 25^\circ\text{C}$	50	50	50	50	W	
$P_D @ T_C = 100^\circ\text{C}$	25	25	25	25	W	
Junction To Case	Linear Derating Factor	0.4	0.4	0.4	0.4	W/ $^\circ\text{C}$
Junction To Ambient	Linear Derating Factor	.0125	.0125	.0125	.0125	W/ $^\circ\text{C}$
$T_J$	Operating and					
$T_{stg}$	Storage Temperature Range	-55 to 150	-55 to 150	-55 to 150	-55 to 150	$^\circ\text{C}$
Lead Solder Temperature (1/16" from case for 5 secs.)		225	225	225	225	$^\circ\text{C}$

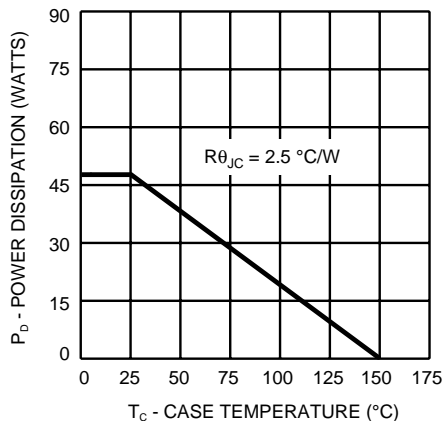
1 **Pulse Test:** Pulse width 300  $\mu\text{sec}$ . Duty Cycle 2%.

2 **Package PIN Limitations** = 15 Amps

**THERMAL RESISTANCE**

$R_{thJC}$	Junction-to-Case	2.5	$^\circ\text{C}/\text{W}$	
$R_{thJA}$	Junction-to-Ambient	80	$^\circ\text{C}/\text{W}$	Free Air Operation

**POWER DERATING**



**MECHANICAL OUTLINE**

