

POWER MOSFET IN HERMETIC ISOLATED 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

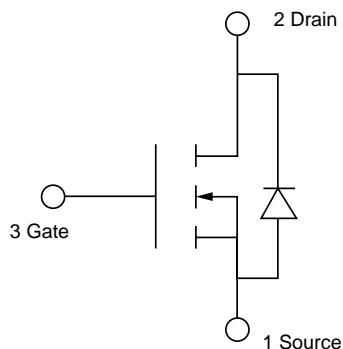
DESCRIPTION

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.

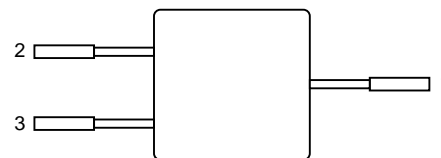
MAXIMUM RATINGS @ $T_C = 25^\circ C$

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_C = 25°C unless otherwise noted)
STATIC P/N OM6101ST / OM6038SM (100V)**

Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV _{DSS} Drain-Source Breakdown Voltage	100			V	V _{GS} = 0, I _b = 250 μA
V _{GS(th)} Gate-Threshold Voltage	2.0	4.0		V	V _{DS} = V _{GS} , I _b = 250 μA
I _{SSS} Gate-Body Leakage (OM6101)		± 500		nA	V _{GS} = ± 12.8 V
I _{SSS} Gate-Body Leakage (OM6001)		± 100		nA	V _{GS} = ± 20 V
I _{BSS} 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	14			A	V _{DS} = 2 V _{DS(on)} , V _{GS} = 10 V
V _{DS(on)} Static Drain-Source On-State Voltage ¹		1.2	1.60	V	V _{GS} = 10 V, I _b = 8 A
R _{DS(on)} Static Drain-Source On-State Resistance ¹			0.20		V _{GS} = 10 V, I _b = 8 A
R _{DS(on)} Static Drain-Source On-State Resistance ¹			0.40		V _{GS} = 10 V, I _b = 8 A, T _C = 125°C

DYNAMIC

Parameter	Min.	Typ.	Max.	Units	Test Conditions
g _{fs} Forward Transconductance ¹	4.0			S(Ω)	V _{DS} = 2 V _{DS(on)} , I _b = 8 A
C _{iss} Input Capacitance		750		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 _{rd(on)} Turn-On Delay Time		15		ns	V _{DD} = 30V, I _b ≅ 8 A
t _r Rise Time		35		ns	R _g = 7.5 Ω, V _{DS} = 10 V
t _{df(off)} Turn-Off Delay Time		38		ns	
t _f Fall Time		23		ns	

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter	Min.	Typ.	Max.	Units	Test Conditions
I _S Continuous Source Current (Body Diode)			- 14	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier.
I _{SM} Source Current ¹ (Body Diode)			- 56	A	
V _{SD} Diode Forward Voltage ¹			- 2.5	V	T _C = 25°C, I _S = -14 A, V _{GS} = 0
t _{rr} Reverse Recovery Time		100		ns	T _C = 25°C, I _S = -12 A, V _{GS} = 0 T _J = 150°C, I _F = I _S , dI _F /ds = 100 A/μs

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

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

Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV _{DSS} Drain-Source Breakdown Voltage	200			V	V _{GS} = 0, I _b = 250 μA
V _{GS(th)} Gate-Threshold Voltage	2.0	4.0		V	V _{DS} = V _{GS} , I _b = 250 μA
I _{SSS} Gate-Body Leakage (OM6102)		± 500		nA	V _{GS} = ± 12.8 V
I _{SSS} Gate-Body Leakage (OM6002)		± 100		nA	V _{GS} = ± 20 V
I _{BSS} 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	9.0			A	V _{DS} = 2 V _{DS(on)} , V _{GS} = 10 V
V _{DS(on)} Static Drain-Source On-State Voltage ¹		1.25	2.2	V	V _{GS} = 10 V, I _b = 5.0 A
R _{DS(on)} Static Drain-Source On-State Resistance ¹			0.44		V _{GS} = 10 V, I _b = 5.0 A
R _{DS(on)} Static Drain-Source On-State Resistance ¹			0.88		V _{GS} = 10 V, I _b = 5.0 A, T _C = 125°C

DYNAMIC

Parameter	Min.	Typ.	Max.	Units	Test Conditions
g _{fs} Forward Transconductance ¹	3.0	5.8		S(Ω)	V _{DS} = 2 V _{DS(on)} , I _b = 5.0 A
C _{iss} Input Capacitance		780		pF	V _{GS} = 0
C _{oss} Output Capacitance		150		pF	V _{DS} = 25 V
C _{rss} Reverse Transfer Capacitance		55		pF	f = 1 MHz
t _{rd(on)} Turn-On Delay Time		9		ns	V _{DD} = 75V, I _b ≅ 5.0 A
t _r Rise Time		18		ns	R _g = 7.5 Ω, V _{GS} = 10 V
t _{df(off)} Turn-Off Delay Time		45		ns	
t _f Fall Time		27		ns	

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter	Min.	Typ.	Max.	Units	Test Conditions
I _S Continuous Source Current (Body Diode)			- 9	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier.
I _{SM} Source Current ¹ (Body Diode)			- 36	A	
V _{SD} Diode Forward Voltage ¹			- 2	V	T _C = 25°C, I _S = -9 A, V _{GS} = 0
t _{rr} Reverse Recovery Time		250		ns	T _C = 25°C, I _S = -8 A, V _{GS} = 0 T _J = 150°C, I _F = I _S , dI _F /ds = 100 A/μs

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

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

Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV _{DSS} Drain-Source Breakdown Voltage	400			V	V _{GS} = 0, I _b = 250 μA
V _{GS(th)} Gate-Threshold Voltage	2.0	4.0		V	V _{DS} = V _{GS} , I _b = 250 μA
I _{SS} Gate-Body Leakage (OM6103)		± 500		nA	V _{GS} = ± 12.8 V
I _{SS} Gate-Body Leakage (OM6003)		± 100		nA	V _{GS} = ± 20 V
I _{DSS} Zero Gate Voltage Drain Current		0.1	0.25	mA	V _{GS} = Max. Rat., V _{GS} = 0
		0.2	1.0	mA	V _{GS} = 0.8 Max. Rat., V _{GS} = 0, T _C = 125°C
I _{D(on)} On-State Drain Current ¹	5.5			A	V _{DS} = 2 V _{DS(on)} , V _{GS} = 10 V
V _{DS(on)} Static Drain-Source On-State Voltage ¹		2.4	3.15	V	V _{GS} = 10 V, I _b = 3.0 A
R _{DS(on)} Static Drain-Source On-State Resistance ¹			1.05		V _{GS} = 10 V, I _b = 3.0 A
R _{DS(on)} Static Drain-Source On-State Resistance ¹			2.0		V _{GS} = 10 V, I _b = 3.0 A, T _C = 125°C

DYNAMIC

g _{fs} Forward Transductance ¹	3.0	3.6		S(Ω)	V _{DS} = 2 V _{DS(on)} , I _b = 3.0 A
C _{iss} Input Capacitance		700		pF	V _{GS} = 0
C _{oss} Output Capacitance		70		pF	V _{DS} = 25 V
C _{rss} Reverse Transfer Capacitance		20		pF	f = 1 MHz
t _{d(on)} Turn-On Delay Time		18		ns	V _{DS} = 175 V, I _b = 3.0 A
t _r Rise Time		20		ns	R _g = 10 Ω, V _{GS} = 10 V
t _{d(off)} Turn-Off Delay Time		40		ns	
t _f Fall Time		25		ns	

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

I _S Continuous Source Current (Body Diode)			- 5.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier.
I _{SM} Source Current ¹ (Body Diode)			- 22	A	
V _{SD} Diode Forward Voltage ¹			- 1.6	V	T _C = 25°C, I _S = -5.5 A, V _{GS} = 0
t _{rr} Reverse Recovery Time		470		ns	T _C = 25°C, I _S = -4.5 A, V _{GS} = 0 T _J = 150°C, I _F = I _S , dI _F /ds = 100 A/μs

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

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

Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV _{DSS} Drain-Source Breakdown Voltage	500			V	V _{GS} = 0, I _b = 250 μA
V _{GS(th)} Gate-Threshold Voltage	2.0	4.0		V	V _{DS} = V _{GS} , I _b = 250 μA
I _{SS} Gate-Body Leakage (OM6104)		± 500		nA	V _{GS} = ± 12.8 V
I _{SS} Gate-Body Leakage (OM6004)		± 100		nA	V _{GS} = ± 20 V
I _{DSS} Zero Gate Voltage Drain Current		0.1	0.25	mA	V _{GS} = Max. Rat., V _{GS} = 0
		0.2	1.0	mA	V _{GS} = 0.8 Max. Rat., V _{GS} = 0, T _C = 125°C
I _{D(on)} On-State Drain Current ¹	4.5			A	V _{DS} = 2 V _{DS(on)} , V _{GS} = 10 V
V _{DS(on)} Static Drain-Source On-State Voltage ¹		3.25	4.00	V	V _{GS} = 10 V, I _b = 2.5 A
R _{DS(on)} Static Drain-Source On-State Resistance ¹			1.6		V _{GS} = 10 V, I _b = 2.5 A
R _{DS(on)} Static Drain-Source On-State Resistance ¹			3.3		V _{GS} = 10 V, I _b = 2.5 A, T _C = 125°C

DYNAMIC

g _{fs} Forward Transductance ¹	2.5	2.8		S(Ω)	V _{DS} = 2 V _{DS(on)} , I _b = 2.5 A
C _{iss} Input Capacitance		700		pF	V _{GS} = 0
C _{oss} Output Capacitance		90		pF	V _{DS} = 25 V
C _{rss} Reverse Transfer Capacitance		30		pF	f = 1 MHz
t _{d(on)} Turn-On Delay Time		18		ns	V _{DS} = 225 V, I _b = 2.5 A
t _r Rise Time		20		ns	R _g = 7.5 Ω, V _{GS} = 10 V
t _{d(off)} Turn-Off Delay Time		42		ns	
t _f Fall Time		25		ns	

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

I _S Continuous Source Current (Body Diode)			- 4.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier.
I _{SM} Source Current ¹ (Body Diode)			- 18	A	
V _{SD} Diode Forward Voltage ¹			- 1.4	V	T _C = 25°C, I _S = -4.5 A, V _{GS} = 0
t _{rr} Reverse Recovery Time		430		ns	T _C = 25°C, I _S = -4 A, V _{GS} = 0 T _J = 150°C, I _F = I _S , dI _F /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
$I_D @ T_C = 25^\circ\text{C}$	± 14	± 9	± 5	± 4	A
$I_D @ T_C = 100^\circ\text{C}$	± 7	± 5	± 3	± 2	A
I_{DM}	± 45	± 35	± 18	± 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	0.4	0.4	0.4	0.4	W/ $^\circ\text{C}$
Junction To Ambient	.0125	.0125	.0125	.0125	W/ $^\circ\text{C}$
T_J	Operating and				
T_{stg}	Storage Temperature Range				
Lead Solder Temperature (1/16" from case for 5 secs.)	225	225	225	225	$^\circ\text{C}$

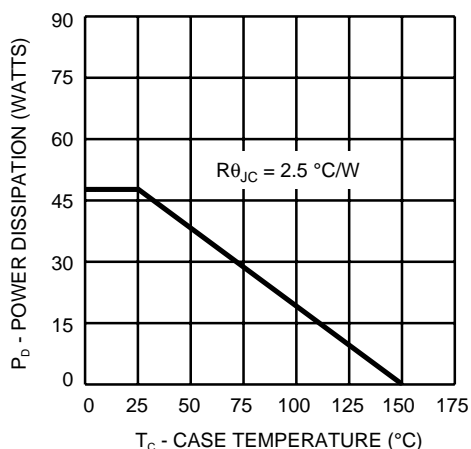
1 Pulse Test: Pulse width 300 μsec . Duty Cycle 2%.

2 Package PIN Limitations = 15 Amps

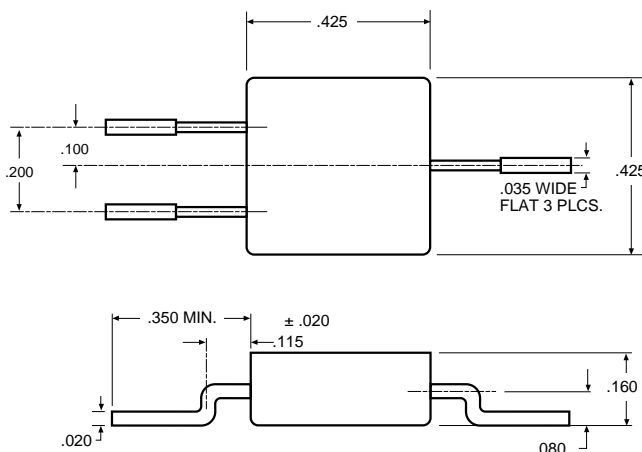
THERMAL RESISTANCE

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

POWER DERATING



MECHANICAL OUTLINE



3.5

