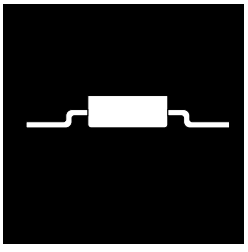
POWER MOSFET IN HERMETIC ISOLATED SURFACE MOUNT PACKAGE



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

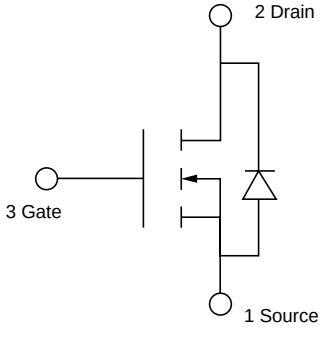
DESCRIPTION

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.

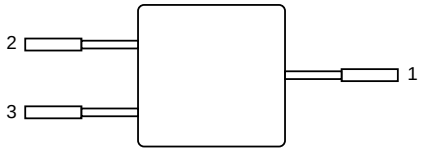
MAXIMUM RATINGS @ T_C = 25°C

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

SCHEMATIC



PIN CONNECTION



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

3.5

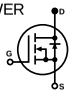
ELECTRICAL CHARACTERISTICS: (T_C = 25°C unless otherwise noted)
STATIC P/N OM6101ST / OM6038SM (100V)

Parameter		Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	100			V	V_{GS} = 0, I_D = 250 µA
$V_{GS(th)}$	Gate-Threshold Voltage	2.0		4.0	V	V_{DS} = V_{GS}, I_D = 250 µA
I_{GSS}	Gate-Body Leakage (OM6101)			± 500	nA	V_{GS} = ± 12.8 V
I_{GSS}	Gate-Body Leakage (OM6001)			± 100	nA	V_{GS} = ± 20 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]	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_D = 8 A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]			0.20	Ω	V_{GS} = 10 V, I_D = 8 A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]			0.40	Ω	V_{GS} = 10 V, I_D = 8 A, T_C = 125°C

DYNAMIC

g_{fs}	Forward Transductance[1]	4.0			S (℧)	V_{DS} ≥ 2 $V_{DS(on)}$, I_D = 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
$t_{d(on)}$	Turn-On Delay Time		15		ns	V_{DD} = 30V, I_D ≅ 8 A
t_r	Rise Time		35		ns	R_g = 7.5 Ω, V_{DS} = 10 V
$t_{d(off)}$	Turn-Off Delay Time		38		ns	
t_f	Fall Time		23		ns	

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

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_C = 25°C, I_S = -12 A, V_{GS} = 0
t_{rr}	Reverse Recovery Time		100		ns	T_J = 150°C, I_F = I_S, dI_F/ds = 100 A/µs

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

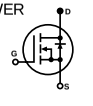
ELECTRICAL CHARACTERISTICS: (T_C = 25°C unless otherwise noted)
STATIC P/N OM6039SM (200V)

Parameter		Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	200			V	V_{GS} = 0, I_D = 250 µA
$V_{GS(th)}$	Gate-Threshold Voltage	2.0		4.0	V	V_{DS} = V_{GS}, I_D = 250 µA
I_{GSS}	Gate-Body Leakage (OM6102)			± 500	nA	V_{GS} = ± 12.8 V
I_{GSS}	Gate-Body Leakage (OM6002)			± 100	nA	V_{GS} = ± 20 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]	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_D = 5.0 A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]			0.44	Ω	V_{GS} = 10 V, I_D = 5.0 A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]			0.88	Ω	V_{GS} = 10 V, I_D = 5.0 A, T_C = 125°C

DYNAMIC

g_{fs}	Forward Transductance[1]	3.0	5.8		S(℧)	V_{DS} ≥ 2 $V_{DS(on)}$, I_D = 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
$t_{d(on)}$	Turn-On Delay Time		9		ns	V_{DD} = 75V, I_D ≅ 5.0 A
t_r	Rise Time		18		ns	R_g = 7.5 Ω, V_{GS} =10 V
$t_{d(off)}$	Turn-Off Delay Time		45		ns	
t_f	Fall Time		27		ns	

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

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_C = 25°C, I_S = -8 A, V_{GS} = 0
t_{rr}	Reverse Recovery Time		250		ns	T_J = 150°C, I_F = I_S, dI_F/ds = 100 A/µs

1 Pulse Test: Pulse Width ≤ 300µsec, 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_D = 250 µA
$V_{GS(th)}$	Gate-Threshold Voltage	2.0		4.0	V	$V_{DS} = V_{GS}$, I_D = 250 µA
I_{GSS}	Gate-Body Leakage (OM6103)			± 500	nA	V_{GS} = ± 12.8 V
I_{GSS}	Gate-Body Leakage (OM6003)			± 100	nA	V_{GS} = ± 20 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]	5.5			A	$V_{DS} \geq 2\ V_{DS(on)}$, V_{GS} = 10 V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]		2.4	3.15	V	V_{GS} = 10 V, I_D = 3.0 A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]			1.05	Ω	V_{GS} = 10 V, I_D = 3.0 A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]			2.0	Ω	V_{GS} = 10 V, I_D = 3.0 A, T_C = 125°C

DYNAMIC

g_{fs}	Forward Transductance[1]	3.0	3.6		S (℧)	$V_{DS} \geq 2\ V_{DS(on)}$, I_D = 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_{DD} = 175 V, $I_D \cong$ 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_C = 25°C, I_S = -4.5 A, V_{GS} = 0
t_{rr}	Reverse Recovery Time		470		ns	T_J = 150°C, $I_F = I_S$, dI_F/ds = 100 A/µs

1 Pulse Test: Pulse Width ≤ 300µsec, 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_D = 250 µA
$V_{GS(th)}$	Gate-Threshold Voltage	2.0		4.0	V	$V_{DS} = V_{GS}$, I_D = 250 µA
I_{GSS}	Gate-Body Leakage (OM6104)			± 500	nA	V_{GS} = ± 12.8 V
I_{GSS}	Gate-Body Leakage (OM6004)			± 100	nA	V_{GS} = ± 20 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]	4.5			A	$V_{DS} \geq 2\ V_{DS(on)}$, V_{GS} = 10 V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]		3.25	4.00	V	V_{GS} = 10 V, I_D = 2.5 A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]			1.6	Ω	V_{GS} = 10 V, I_D = 2.5 A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]		2.9	3.3	Ω	V_{GS} = 10 V, I_D = 2.5 A, T_C = 125°C

DYNAMIC

g_{fs}	Forward Transductance[1]	2.5	2.8		S (℧)	$V_{DS} \geq 2\ V_{DS(on)}$, I_D = 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_{DD} = 225 V, $I_D \cong$ 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_C = 25°C, I_S = -4 A, V_{GS} = 0
t_{rr}	Reverse Recovery Time		430		ns	T_J = 150°C, $I_F = I_S$, dI_F/ds = 100 A/µs

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

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

	Parameter	OM6038	OM6039	OM6040	OM6041	Units
V_{DS}	Drain-Source Voltage	100	200	400	500	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	100	200	400	500	V
I_D @ T_C = 25°C	Continuous Drain Current[2]	± 14	± 9	± 5	± 4	A
I_D @ T_C = 100°C	Continuous Drain Current[2]	± 7	± 5	± 3	± 2	A
I_{DM}	Pulsed Drain Current[1]	± 45	± 35	± 18	± 10	A
P_D @ T_C = 25°C	Maximum Power Dissipation	50	50	50	50	W
P_D @ T_C = 100°C	Maximum Power Dissipation	25	25	25	25	W
Junction To Case	Linear Derating Factor	0.4	0.4	0.4	0.4	W/°C
Junction To Ambient	Linear Derating Factor	.0125	.0125	.0125	.0125	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 Solder Temperature	(1/16" from case for 5 secs.)	225	225	225	225	°C

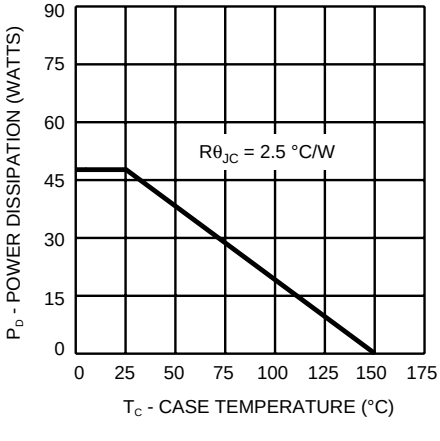
1 Pulse Test: Pulse width ≤ 300 µsec. Duty Cycle ≤ 2%.

2 Package PIN Limitations = 15 Amps

THERMAL RESISTANCE

R_{thJC}	Junction-to-Case	2.5	°C/W	
R_{thJA}	Junction-to-Ambient	80	°C/W	Free Air Operation

POWER DERATING



MECHANICAL OUTLINE