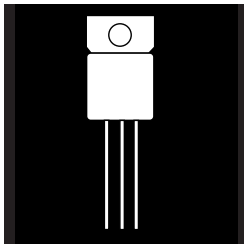
POWER MOSFET IN HERMETIC ISOLATED JEDEC TO-257AA PACKAGE



100V Thru 500V, Up To 14 Amp, N-Channel MOSFET With Or Without Zener Gate Clamp Protection

FEATURES

- Isolated Hermetic Metal Package
- Bi-Lateral Zener Gate Protection (Optional)
- 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 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 zener clamps in the OM6101ST series.

MAXIMUM RATINGS

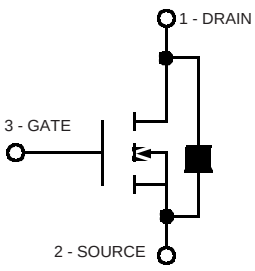
PART NUMBER	V_{DS}	$R_{DS(on)}$	I_D
OM6001ST/OM6101ST	100 V	.20	14 A
OM6002ST/OM6102ST	200 V	.44	9 A
OM6003ST/OM6103ST	400 V	1.05	5.5 A
OM6004ST/OM6104ST	500 V	1.60	4.5 A

Note: OM6101ST thru OM6104ST is supplied with zener gate protection.
OM6001ST thru OM6004ST is supplied without zener gate protection.

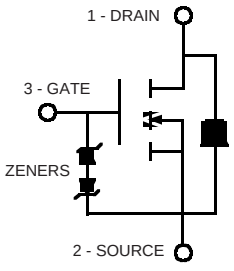
3.1

SCHEMATIC

WITHOUT ZENER CLAMPS
OM6001ST - 6004ST



WITH ZENER CLAMPS
OM6101ST - 6104ST



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ELECTRICAL CHARACTERISTICS: (T_C = 25°C unless otherwise noted)

STATIC P/N OM6101ST / OM6001ST (100V)

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_{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		V_{GS} = 10 V, I_D = 8 A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]			0.40		V_{GS} = 10 V, I_D = 8 A, T_C = 125 C
DYNAMIC						
g_{fs}	Forward Transductance[1]	4.0			S(Ʊ)	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} = 30 V, 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/ms

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

ELECTRICAL CHARACTERISTICS: (T_C = 25°C unless otherwise noted)

STATIC P/N OM6102ST / OM6002 ST (200V)

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_{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		V_{GS} = 10 V, I_D = 5.0 A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]			0.88		V_{GS} = 10 V, I_D = 5.0 A, T_C = 125 C
DYNAMIC						
g_{fs}	Forward Transductance[1]	3.0	5.8		S(Ʊ)	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/ms

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

ELECTRICAL CHARACTERISTICS: (T_C = 25°C unless otherwise noted)

STATIC P/N OM6103ST / OM6003ST (400V)

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_{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} 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		V_{GS} = 10 V, I_D = 3.0 A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]			2.0		V_{GS} = 10 V, I_D = 3.0 A, T_C = 125 C

DYNAMIC

g_{fs}	Forward Transductance[1]	3.0	3.6		S (M)	V_{DS} 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 @ 3.0 A
t_r	Rise Time		20		ns	R_g = 10 W, 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/ms

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

ELECTRICAL CHARACTERISTICS: (T_C = 25°C unless otherwise noted)

STATIC P/N OM6104ST / OM6004ST (500V)

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_{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} 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		V_{GS} = 10 V, I_D = 2.5 A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]		2.9	3.3		V_{GS} = 10 V, I_D = 2.5 A, T_C = 125 C

DYNAMIC

g_{fs}	Forward Transductance[1]	2.5	2.8		S (M)	V_{DS} 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 @ 2.5 A
t_r	Rise Time		20		ns	R_g = 7.5 W, 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/ms

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

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

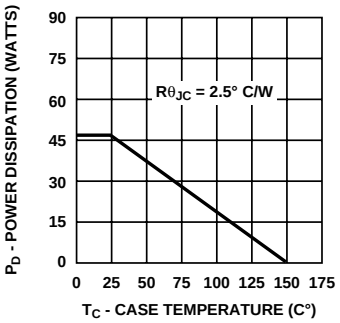
	Parameter	OM6001ST OM6101ST	OM6002ST OM6102ST	OM6003ST OM6103ST	OM6004ST OM6104ST	Units
V_{DS}	Drain-Source Voltage	100	200	400	500	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 M)	100	200	400	500	V
I_D @ T_C = 25°C	Continuous Drain Current[2]	±14	±9	±5.5	±4.5	A
I_D @ T_C = 100°C	Continuous Drain Current[2]	±9	±6	±3.5	±3	A
I_{DM}	Pulsed Drain Current[1]	±56	±36	±22	±18	A
P_D @ T_C = 25°C	Maximum Power Dissipation	50	50	50	50	W
P_D @ T_C = 100°C	Maximum Power Dissipation	20	20	20	20	W
Junction To Case	Linear Derating Factor	0.4	0.4	0.4	0.4	W/°C
Junction To Ambient	Linear Derating Factor	.015	.015	.015	.015	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 Limitations = 16 amps

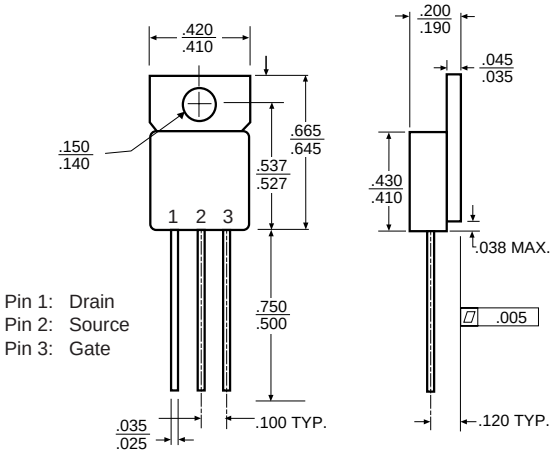
THERMAL RESISTANCE (MAXIMUM) at T_A = 25°C

R_{thJC}	Junction-to-Case	2.5	°C/W
R_{thJA}	Junction-to-Ambient	65	°C/W Free Air Operation

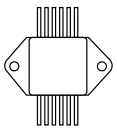
POWER DERATING

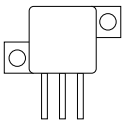


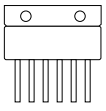
MECHANICAL OUTLINE WITH PIN CONNECTION



PACKAGE OPTIONS


MOD PAK


Z-TAB


6 PIN SIP

Note: MOSFETs are also available in Z-Tab, dual and quad pak styles. Duals and quads available in non-gate versions only. Please call the factory for more information.

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