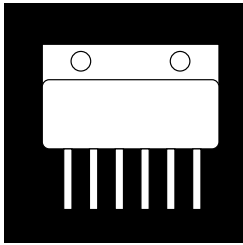


OM6227SS OM6230SS OM6232SS  
OM6228SS OM6231SS OM6233SS

# DUAL HIGH CURRENT POWER MOSFETS IN HERMETIC ISOLATED SIP PACKAGE



**400V, 500V, 1000V, Up To 24 Amp N-Channel,  
Dual Size 6 High Energy MOSFETs**

## FEATURES

- Dual Uncommitted MOSFETs
- Isolated Hermetic Metal Package
- Size 6 Die, High Energy, High Voltage
- 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. This series also features avalanche high energy capability at elevated temperatures.

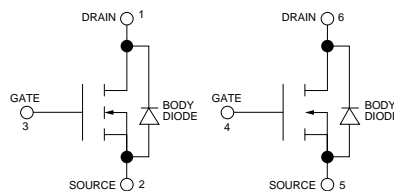
## MAXIMUM RATINGS

PART NUMBER	$V_{DS}$	$R_{DS(on)}$	$I_D$ (Amp)	*Package
OM6227SS	400	.20	24	S-6D
OM6228SS	500	.27	22	S-6D
OM6230SS	1000	1.30	10	S-6D
OM6231SS	400	.20	24	S-6E
OM6232SS	500	.27	22	S-6E
OM6233SS	1000	1.30	10	S-6E

\* See Mechanical Drawing

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## SCHEMATIC



**ELECTRICAL CHARACTERISTICS: 400V (Per MOSFET)** (T<sub>C</sub> = 25° unless otherwise noted)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
<b>OFF CHARACTERISTICS</b>					
Drain-Source Breakdown Voltage (V <sub>GS</sub> = 0, I <sub>D</sub> = 0.25 mA)	V <sub>(BR)DSS</sub>	400	-	-	Vdc
Zero Gate Voltage Drain (V <sub>DS</sub> = 400 V, V <sub>GS</sub> = 0) (V <sub>DS</sub> = 320 V, V <sub>GS</sub> = 0, T <sub>J</sub> = 125° C)	I <sub>bss</sub>	-	-	0.25 1.0	mAdc
Gate-Body Leakage Current, Forward (V <sub>GSF</sub> = 20 Vdc, V <sub>DS</sub> = 0)	I <sub>GSSF</sub>	-	-	100	nAdc
Gate-Body Leakage Current, Reverse (V <sub>GSR</sub> = 20 Vdc, V <sub>DS</sub> = 0)	I <sub>GSSR</sub>	-	-	100	nAdc

**ON CHARACTERISTICS\***

Gate-Threshold Voltage (V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 0.25 mAdc) (T <sub>J</sub> = 125° C)	V <sub>GS(th)</sub>	2.0 1.5	3.0 -	4.0 3.5	Vdc
Static Drain-Source On-Resistance (V <sub>GS</sub> = 10 Vdc, I <sub>D</sub> = 13 Adc)	r <sub>DS(on)</sub>	-	-	0.20	Ohm
Drain-Source On-Voltage (V <sub>GS</sub> = 10 Vdc) (I <sub>D</sub> = 24 A) (I <sub>D</sub> = 12 A, T <sub>J</sub> = 125° C)	V <sub>DS(on)</sub>	-	-	5.0 5.0	Vdc
Forward Transconductance (V <sub>DS</sub> = 15 Vdc, I <sub>D</sub> = 12A Adc)	g <sub>FS</sub>	14	-	-	mhos

**DYNAMIC CHARACTERISTICS**

Input Capacitance	(V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 0, f = 1.0 MHz)	C <sub>iss</sub>	-	4000	-	pF
Output Capacitance		C <sub>oss</sub>	-	550	-	
Transfer Capacitance		C <sub>rss</sub>	-	110	-	

**SWITCHING CHARACTERISTICS**

Turn-On Delay Time	(V <sub>DD</sub> = 250 V, I <sub>D</sub> = 24 A, R <sub>gen</sub> = 4.3 ohms)	t <sub>d(on)</sub>	-	35	-	ns
Rise Time		t <sub>r</sub>	-	95	-	
Turn-Off Delay Time		t <sub>d(off)</sub>	-	80	-	
Fall Time		t <sub>f</sub>	-	80	-	
Total Gate Charge	(V <sub>DS</sub> = 400 V, I <sub>D</sub> = 24 A, V <sub>GS</sub> = 10 V)	Q <sub>g</sub>	-	110	14	nC
Gate-Source Charge		Q <sub>gs</sub>	-	20	-	
Gate-Drain Charge		Q <sub>gd</sub>	-	80	-	

**SOURCE DRAIN DIODE CHARACTERISTICS**

Forward On-Voltage	(I <sub>S</sub> = 24 A, d/dt = 100 A/μs)	V <sub>SD</sub>	-	1.1	1.6	Vdc	
Forward Turn-On Time		t <sub>on</sub>	-	**	-		ns
Reverse Recovery Time		t <sub>rr</sub>	-	500	1000		

\* Indicates Pulse Test = 300 μsec, Duty Cycle = 2%

\*\* Limited by circuit inductance

**ELECTRICAL CHARACTERISTICS: 500V (Per MOSFET)** (T<sub>C</sub> = 25° unless otherwise noted)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
<b>OFF CHARACTERISTICS</b>					
Drain-Source Breakdown Voltage (V <sub>GS</sub> = 0, I <sub>D</sub> = 0.25 mA)	V <sub>(BR)DSS</sub>	500	-	-	Vdc
Zero Gate Voltage Drain (V <sub>DS</sub> = 500 V, V <sub>GS</sub> = 0) (V <sub>DS</sub> = 500 V, V <sub>GS</sub> = 0, T <sub>J</sub> = 125° C)	I <sub>bss</sub>	-	-	0.25 1.0	mAdc
Gate-Body Leakage Current, Forward (V <sub>GSF</sub> = 20 Vdc, V <sub>DS</sub> = 0)	I <sub>GSSF</sub>	-	-	100	nAdc
Gate-Body Leakage Current, Reverse (V <sub>GSR</sub> = 20 Vdc, V <sub>DS</sub> = 0)	I <sub>GSSR</sub>	-	-	100	nAdc

**ON CHARACTERISTICS\***

Gate-Threshold Voltage (V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 0.25 mAdc) (T <sub>J</sub> = 125° C)	V <sub>GS(th)</sub>	2.0 1.5	3.0 -	4.0 3.5	Vdc
Static Drain-Source On-Resistance (V <sub>GS</sub> = 10 Vdc, I <sub>D</sub> = 13 Adc)	r <sub>DS(on)</sub>	-	-	0.27	Ohm
Drain-Source On-Voltage (V <sub>GS</sub> = 10 Vdc) (I <sub>D</sub> = 24 A) (I <sub>D</sub> = 12 A, T <sub>J</sub> = 125° C)	V <sub>DS(on)</sub>	-	-	8.0 8.0	Vdc
Forward Transconductance (V <sub>DS</sub> = 15 Vdc, I <sub>D</sub> = 13 Adc)	g <sub>FS</sub>	13	-	-	mhos

**DYNAMIC CHARACTERISTICS**

Input Capacitance	(V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 0, f = 1.0 MHz)	C <sub>iss</sub>	-	4000	-	pF
Output Capacitance		C <sub>oss</sub>	-	480	-	
Transfer Capacitance		C <sub>rss</sub>	-	95	-	

**SWITCHING CHARACTERISTICS**

Turn-On Delay Time	(V <sub>DD</sub> = 250 V, I <sub>D</sub> = 24 A, R <sub>gen</sub> = 4.3 ohms)	t <sub>d(on)</sub>	-	32	-	ns
Rise Time		t <sub>r</sub>	-	95	-	
Turn-Off Delay Time		t <sub>d(off)</sub>	-	75	-	
Fall Time		t <sub>f</sub>	-	75	-	
Total Gate Charge	(V <sub>DS</sub> = 400 V, I <sub>D</sub> = 24 A, V <sub>GS</sub> = 10 V)	Q <sub>g</sub>	-	115	140	nC
Gate-Source Charge		Q <sub>gs</sub>	-	20	-	
Gate-Drain Charge		Q <sub>gd</sub>	-	60	-	

**SOURCE DRAIN DIODE CHARACTERISTICS**

Forward On-Voltage	(I <sub>S</sub> = 24 A, d/dt = 100 A/μs)	V <sub>SD</sub>	-	1.1	1.6	Vdc	
Forward Turn-On Time		t <sub>on</sub>	-	**	-		ns
Reverse Recovery Time		t <sub>rr</sub>	-	500	1000		

\* Indicates Pulse Test = 300 μsec, Duty Cycle = 2%

\*\* Limited by circuit inductance

**UNCLAMPED DRAIN-TO-SOURCE AVALANCHE CHARACTERISTICS (T<sub>J</sub> < 150°)**

		Symbol	Value	Unit
Single Pulse Drain-To-Source Avalanche Energy	T <sub>J</sub> = 25°C	W <sub>DSS</sub> (1)	1000	mJ
	T <sub>J</sub> = 100°C		160	
Repetitive Pulse Drain-To-Source Avalanche Energy		W <sub>DSS</sub> (2)	25	

(1) V<sub>DD</sub> = 50V, I<sub>D</sub> = 10A

(2) Pulse width and frequency is limited by T<sub>J(max)</sub> and thermal response.

## OM6227SS - OM6233SS

### ELECTRICAL CHARACTERISTICS: 1000V (Per MOSFET) (T<sub>C</sub> = 25° unless otherwise noted)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
<b>OFF CHARACTERISTICS</b>					
Drain-Source Breakdown Voltage (V <sub>GS</sub> = 0, I <sub>D</sub> = 0.25 mA)	V <sub>(BR)DSS</sub>	1000	-	-	Vdc
Zero Gate Voltage Drain (V <sub>DS</sub> = 1000 V, V <sub>GS</sub> = 0) (V <sub>DS</sub> = 1000 V, V <sub>GS</sub> = 0, T <sub>J</sub> = 125° C)	I <sub>DSS</sub>	-	-	10 100	mAdc
Gate-Body Leakage Current, Forward (V <sub>GSSF</sub> = 20 Vdc, V <sub>DS</sub> = 0)	I <sub>GSSF</sub>	-	-	100	nAdc
Gate-Body Leakage Current, Reverse (V <sub>GSSR</sub> = 20 Vdc, V <sub>DS</sub> = 0)	I <sub>GSSR</sub>	-	-	100	nAdc

### ON CHARACTERISTICS\*

Gate-Threshold Voltage (V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 0.25 mAdc (T <sub>J</sub> = 125° C)	V <sub>GS(th)</sub>	2.0 1.5	3.0	4.0 3.5	Vdc
Static Drain-Source On-Resistance (V <sub>GS</sub> = 10 Vdc, I <sub>D</sub> = 5 Adc)	r <sub>DS(on)</sub>	-	-	1.3	Ohm
Drain-Source On-Voltage (V <sub>GS</sub> = 10 Vdc) (I <sub>D</sub> = 10 A) (I <sub>D</sub> = 5 A, T <sub>J</sub> = 125° C)	V <sub>DS(on)</sub>	-	-	15 15.3	Vdc
Forward Transconductance (V <sub>DS</sub> = 15 Vdc, I <sub>D</sub> = 5 Adc)	g <sub>FS</sub>	5.0	-	-	mhos

### DYNAMIC CHARACTERISTICS

Input Capacitance	(V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 0, f = 1.0 MHz)	C <sub>iss</sub>	-	5500	-	pF
Output Capacitance		C <sub>oss</sub>	-	530	-	
Transfer Capacitance		C <sub>rss</sub>	-	90	-	

### SWITCHING CHARACTERISTICS

Turn-On Delay Time	(V <sub>DD</sub> = 500 V, I <sub>D</sub> = 10 A, R <sub>gen</sub> = 9.1 ohms V <sub>GS</sub> = 10 V)	t <sub>d(on)</sub>	-	60	-	ns
Rise Time		t <sub>r</sub>	-	115	-	
Turn-Off Delay Time		t <sub>d(off)</sub>	-	240	-	
Fall Time		t <sub>f</sub>	-	140	-	
Total Gate Charge		(V <sub>DS</sub> = 400 V, I <sub>D</sub> = 10 A, V <sub>GS</sub> = 10 V)	Q <sub>g</sub>	-	140	
Gate-Source Charge	Q <sub>gs</sub>		-	-	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	-	-	

### SOURCE DRAIN DIODE CHARACTERISTICS

Forward On-Voltage	(I <sub>S</sub> = 10 A, d/dt = 100 A/μs)	V <sub>SD</sub>	-	-	1.1	Vdc
Forward Turn-On Time		t <sub>on</sub>	-	**	-	ns
Reverse Recovery Time		t <sub>rr</sub>	-	600	1100	-

\* Indicates Pulse Test = 300 μsec, Duty Cycle = 2%

\*\* Limited by circuit inductance

### ABSOLUTE MAXIMUM RATINGS PER MOSFET (T<sub>C</sub> = 25°C unless otherwise noted)

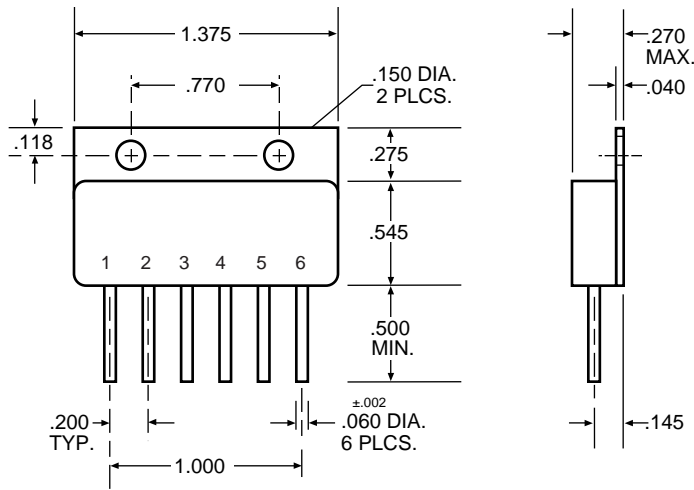
Parameter	OM6227/ OM6231	OM6228/ OM6232	OM6230/ OM6233	Units	
V <sub>DS</sub>	Drain-Source Voltage	400	500	1000	V
V <sub>DGR</sub>	Drain-Gate Voltage (R <sub>GS</sub> = 1 M)	400	500	1000	V
I <sub>D</sub> @ T <sub>C</sub> = 25°C	Continuous Drain Current	24	22	10	A
I <sub>DM</sub>	Pulsed Drain Current	92	85	30	A
P <sub>D</sub> @ T <sub>C</sub> = 25°C	Maximum Power Dissipation	165	165	165	W
P <sub>D</sub>	Derate Above 25°C Case	1.31	1.31	1.31	W/°C
W <sub>DSS</sub> (1)	Single Pulse Energy Drain-To-Source @ 25°C	1000	1000	500	mJ
T <sub>J</sub>	Operating and	-55 to +150	-55 to +150	-55 to +150	°C
T <sub>stg</sub>	Storage Temperature Range				
Lead Temperature	(1/8" from case for 5 secs.)	275	275	275	°C

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### THERMAL RESISTANCE (Maximum) at T<sub>A</sub> = 25°C

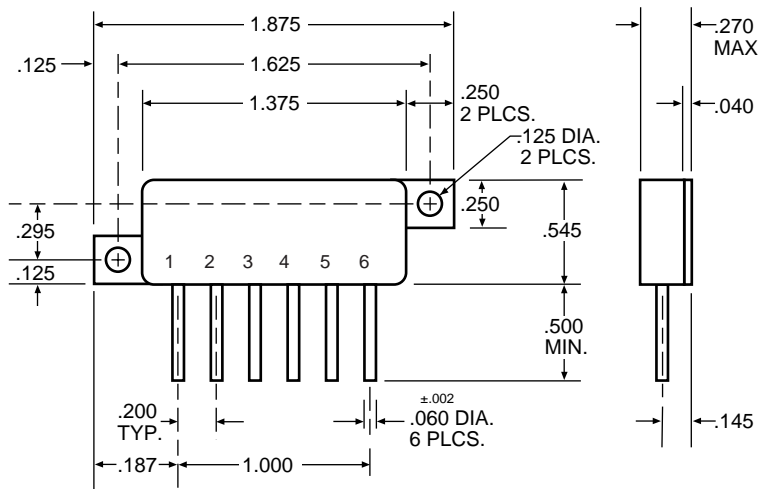
R <sub>thJC</sub>	Junction-to-Case	.76	°C/W	
R <sub>thJA</sub>	Junction-to-Ambient	35	°C/W	Free Air Operation

**MECHANICAL OUTLINE PACKAGE S-6D**



- Pin 1: Drain
- Pin 2: Source
- Pin 3: Gate
- Pin 4: Gate
- Pin 5: Source
- Pin 6: Drain

**MECHANICAL OUTLINE PACKAGE S-6E**



- Pin 1: Drain
- Pin 2: Source
- Pin 3: Gate
- Pin 4: Gate
- Pin 5: Source
- Pin 6: Drain

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