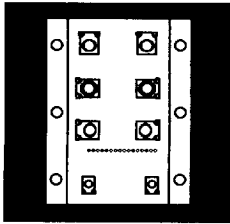


3-PHASE BRIDGE, MULTI-CHIP MODULES IN AN INDUSTRIAL ISOLATED PACKAGE



60 To 600 Volt, 25 To 75 Amp Modules,
3-Phase Bridge Configuration

FEATURES

- Isolated Heat Sink
- Low Inductance Design
- Fast Switching Speed
- Low On Voltage
- Zener Gate Protection

DESCRIPTION

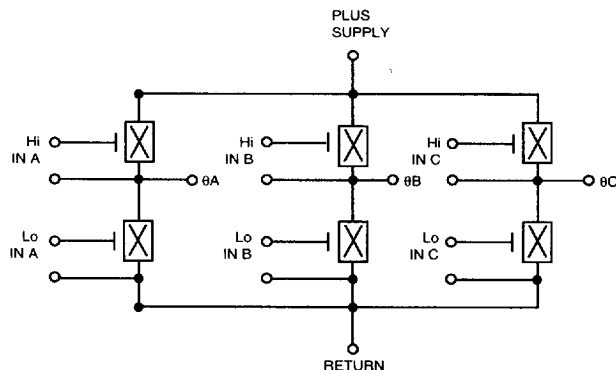
These modules are ideally suited for high density, high reliability switching applications such as Motion Control, UPS and high power SMPS. These multi-chip modules incorporate in one package the power semiconductors preconnected in a three-phase bridge configuration.

GENERAL CHARACTERISTICS (Per Switch) @ 25°C

Part Number	Power Device*	Voltage (V)*	Current (A)	$R_{DS(on)}$ or $V_{CE(sat)}$	Fall Time
OMS75N06ML	MOSFET	60	75	16 m ohms	-
OMS60N10ML	MOSFET	100	60	32 m ohms	-
OMS38L60ML	IGBT	600	75	1.8 Volts	1 μ s
OMS32F60ML	IGBT	600	60	2.9 Volts	250 ns

* Other voltages available.

SCHEMATIC



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ELECTRICAL CHARACTERISTICS: OMS75N06ML/Per Switch ($T_C = 25^\circ$ unless otherwise specified)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS					
Drain-Source Breakdown Voltage, $I_D = 250 \mu A$, $V_{GS} = 0$	$V_{(BR)DSS}$	60	-	-	V
Zero Gate Voltage Drain Current = V_{GS} , $V_{DS} = \text{Max. Rat.}$	I_{DSS}	-	-	25	μA
$V_{DS} = \text{Max. Rat.} \times 0.8$, $T_J = 125^\circ C$		-	-	250	μA
Gate-Body Leakage, $V_{GS} = \pm 20 V$	I_{GSS}	-	-	± 100	nA

ON CHARACTERISTICS

Gate-Threshold Voltage, $V_{GS} = V_{GS(th)}$, $I_D = 250 \mu A$	$V_{GS(th)}$	2.0	-	4.0	V
Static Drain-Source On-Resistance, $V_{GS} = 10 Vdc$, $I_D = 75 A$ $T_J = 100^\circ C$	$R_{DS(on)}$	-	-	15	m Ω
		-	-	30	m Ω
On State Drain Current, $V_{DS} > I_D \times R_{DS(on)}$, Max., $V_{GS} = 10 V$	$I_{D(on)}$	60	-	-	A

DYNAMIC CHARACTERISTICS

Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)}$, Max., $I_D = 30 A$	g_{fs}	15	-	-	mho
Input Capacitance	$V_{DS} = 25 V$, $V_{GS} = 0$	C_{iss}	-	3000	-	pF
Output Capacitance		C_{oss}	-	1000	-	pF
Reverse Transfer Capacitance	$f = 1.0 \text{ MHz}$	C_{rss}	-	200	-	pF

SWITCHING CHARACTERISTICS

Turn-On Delay Time	$V_{DS} = 30 V$, $I_D = 75 A$, $R_{GS} = 9.1 \Omega$	$t_{D(on)}$	-	20	-	ns
Rise Time		t_r	-	225	-	ns
Turn-Off Delay Time		$t_{D(off)}$	-	70	-	ns
Fall Time		t_f	-	125	-	ns

SOURCE DRAIN DIODE CHARACTERISTICS

Source - Drain Current	$I_{SD} = 75 A$, $V_{GS} = 0$	I_{SD}	-	-	75	A
Source - Drain Current (Pulsed)		I_{SDM}^*	-	-	100	A
Forward On-Voltage		V_{SD}	-	-	1.1	V
Reverse Recovery Time		t_{rr}	-	50	-	ns
Reverse Recovered Charge		Q_{rr}	-	0.1	-	μC

ELECTRICAL CHARACTERISTICS: OMS60N10ML/Per Switch ($T_C = 25^\circ$ unless otherwise specified)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS					
Drain-Source Breakdown Voltage, $I_D = 250 \mu A$, $V_{GS} = 0$	$V_{(BR)DSS}$	100	-	-	V
Zero Gate Voltage Drain Current = V_{GS} , $V_{DS} = \text{Max. Rat.}$	I_{DSS}	-	-	250	μA
$V_{DS} = \text{Max. Rat.} \times 0.8$, $T_J = 125^\circ C$		-	-	1000	μA
Gate-Body Leakage, $V_{GS} = \pm 20 V$	I_{GSS}	-	-	± 100	nA

ON CHARACTERISTICS

Gate-Threshold Voltage, $V_{GS} = V_{GS(th)}$, $I_D = 250 \mu A$	$V_{GS(th)}$	2.0	-	4.0	V
Static Drain-Source On-Resistance, $V_{GS} = 10 Vdc$, $I_D = 10 A$ $T_J = 100^\circ C$	$R_{DS(on)}$	-	-	30	m Ω
		-	-	60	m Ω
On State Drain Current, $V_{DS} > I_D \times R_{DS(on)}$, Max., $V_{GS} = 10 V$	$I_{D(on)}$	60	-	-	A

DYNAMIC CHARACTERISTICS

Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)}$, Max., $I_D = 30 A$	g_{fs}	25	-	-	mho
Input Capacitance	$V_{DS} = 25 V$, $V_{GS} = 0$	C_{iss}	-	4000	-	pF
Output Capacitance		C_{oss}	-	1200	-	pF
Reverse Transfer Capacitance	$f = 1.0 \text{ MHz}$	C_{rss}	-	300	-	pF

SWITCHING CHARACTERISTICS

Turn-On Delay Time	$V_{DS} = 80 V$, $I_D = 30 A$, $R_{GS} = 50 \Omega$, $V_{GS} = 10 V$	$t_{D(on)}$	-	90	-	ns
Rise Time		t_r	-	270	-	ns
Turn-Off Delay Time		$t_{D(off)}$	-	200	-	ns
Fall Time		t_f	-	210	-	ns

SOURCE DRAIN DIODE CHARACTERISTICS

Source - Drain Current	$I_{SD} = 60 A$, $V_{GS} = 0$, $di/dt = 100 A/\mu Sec$	I_{SD}	-	-	60	A
Source - Drain Current (Pulsed)		I_{SDM}^*	-	-	240	A
Forward On-Voltage		V_{SD}	-	-	2.4	V
Reverse Recovery Time		t_{rr}	-	180	-	ns
Reverse Recovered Charge		Q_{rr}	-	2.0	-	μC

* Indicates Pulse Test $< 300 \mu sec$, Duty Cycle $\leq 1.5\%$

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ELECTRICAL CHARACTERISTICS: OMS38L60ML/Per Switch ($T_C = 25^\circ$ unless otherwise specified)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS					
Collector Emitter Breakdown Voltage, $I_C = 250 \mu A$, $V_{CE} = 0$	V_{BRVCE}	600	-	-	V
Zero Gate Voltage Drain Current, $V_{GE} = 0$, $V_{CE} = \text{Max. Rat.}$	I_{CES}	-	-	.25	mA
$V_{CE} = 0.8 \text{ Max. Rat.}$, $V_{GE} = 0$, $T_J = 125^\circ C$		-	-	1.0	mA
Gate Emitter Leakage Current, $V_{GE} = \pm 20 V$, $V_{CE} = 0$	I_{GES}	-	-	± 100	nA

ON CHARACTERISTICS

Gate-Threshold Voltage, $V_{CE} = V_{GE}$, $I_C = 25 \text{ mA}$	$V_{GE(TH)}$	2.5	-	5.0	V
Collector Emitter Saturation Voltage, $V_{GE} = 15 V$, $I_C = 38 A$, $T_J = 125^\circ C$	$V_{CE(SAT)}$	-	-	1.8	V

DYNAMIC CHARACTERISTICS

Forward Transconductance	$V_{CE} = 10 V$, $I_C = 38 A$	g_{fs}	15	-	-	S
Input Capacitance	$V_{GE} = 0$	C_{iss}	-	2500	-	pF
Output Capacitance	$V_{CE} = 25 V$	C_{oss}	-	250	-	pF
Reverse Transfer Capacitance	$f = 1.0 \text{ MHz}$	C_{res}	-	75	-	pF

SWITCHING CHARACTERISTICS

Turn-On Delay Time	$V_{CC} = 480 V$, $I_C = 38 A$, $R_{GS} = 10 \Omega$, $V_{GS} = 15 V$, $L = 100 \mu H$	$t_{d(on)}$	-	30	-	ns
Rise Time		t_r	-	150	-	ns
Turn-Off Delay Time		$t_{d(off)}$	-	600	-	ns
Fall Time		t_f	-	500	-	ns

SOURCE DRAIN DIODE CHARACTERISTICS

Maximum Forward Voltage	$I_F = 60 A$, $T_C = 25^\circ C$	V_F	-	-	1.85	V
	$I_F = 60 A$, $T_J = 125^\circ C$		-	-	1.5	
Maximum Reverse Current	$V_R = 600 V$, $T_C = 25^\circ C$	I_R	-	-	100	μA
	$V_R = 480 V$, $T_J = 125^\circ C$		-	-	7.0	mA
Reverse Recovery Time	$I_F = 1 A$, $dI/dt = 200 A/\mu S$	t_r	-	-	50	nS
	$V_R = 30 V$, $T_J = 25^\circ C$		-	-		

ELECTRICAL CHARACTERISTICS: OMS32F60ML/Per Switch ($T_C = 25^\circ$ unless otherwise specified)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS					
Collector Emitter Breakdown Voltage, $I_C = 250 \mu A$, $V_{CE} = 0$	V_{BRVCE}	600	-	-	V
Zero Gate Voltage Drain Current, $V_{GE} = 0$, $V_{CE} = \text{Max. Rat.}$	I_{CES}	-	-	0.25	mA
$V_{CE} = 0.8 \text{ Max. Rat.}$, $V_{GE} = 0$, $T_J = 125^\circ C$		-	-	1.0	mA
Gate Emitter Leakage Current, $V_{GE} = \pm 20 V$, $V_{CE} = 0$	I_{GES}	-	-	± 100	nA

ON CHARACTERISTICS

Gate-Threshold Voltage, $V_{CE} = V_{GE}$, $I_C = 25 \text{ mA}$	$V_{GE(TH)}$	4.5	-	6.5	V
Collector Emitter Saturation Voltage, $V_{GE} = 15 V$, $I_C = 32 A$, $T_J = 125^\circ C$	$V_{CE(SAT)}$	-	-	2.9	V

DYNAMIC CHARACTERISTICS

Forward Transconductance	$V_{CE} = 10 V$, $I_C = 32 A$	g_{fs}	15	-	-	S
Input Capacitance	$V_{GE} = 0$	C_{iss}	-	2500	-	pF
Output Capacitance	$V_{CE} = 25 V$	C_{oss}	-	250	-	pF
Reverse Transfer Capacitance	$f = 1.0 \text{ MHz}$	C_{res}	-	75	-	pF

SWITCHING CHARACTERISTICS

Turn-On Delay Time	$V_{CC} = 480 V$, $I_C = 32 A$, $R_{GS} = 4.7 \Omega$, $V_{GS} = 15 V$	$t_{d(on)}$	-	25	-	ns
Rise Time		t_r	-	30	-	ns
Turn-Off Delay Time		$t_{d(off)}$	-	175	-	ns
Fall Time		t_f	-	125	-	ns

SOURCE DRAIN DIODE CHARACTERISTICS

Maximum Forward Voltage	$I_F = 60 A$, $T_C = 25^\circ C$	V_F	-	-	1.85	V
	$I_F = 60 A$, $T_J = 125^\circ C$		-	-	1.5	
Maximum Reverse Current	$V_R = 600 V$, $T_C = 25^\circ C$	I_R	-	-	100	μA
	$V_R = 480 V$, $T_J = 125^\circ C$		-	-	7.0	mA
Reverse Recovery Time	$I_F = 1 A$, $dI/dt = 200 A/\mu S$	t_r	-	-	50	nS
	$V_R = 30 V$, $T_J = 25^\circ C$		-	-		

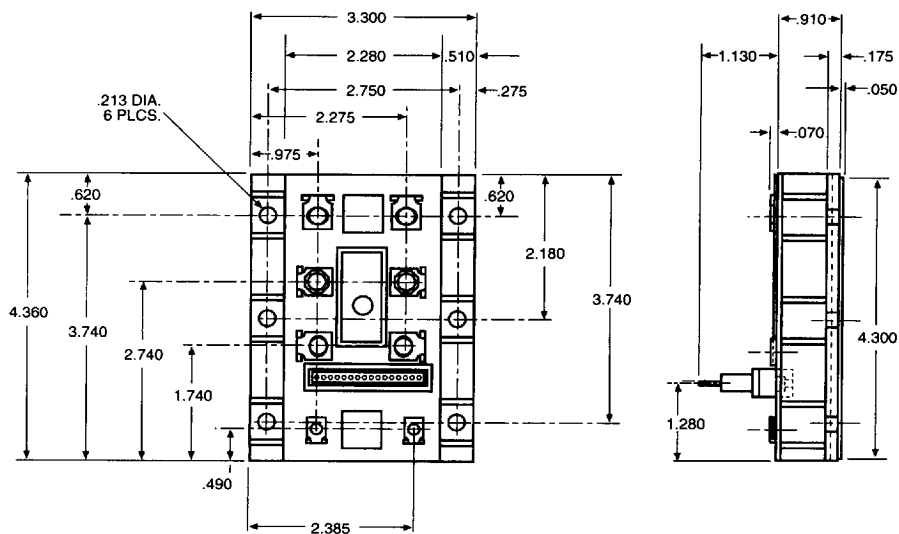
ABSOLUTE MAXIMUM RATINGS Per Switch ($T_C = 25^\circ\text{C}$ unless otherwise noted)
IGBT / MOSFET

Parameters		75N06ML	60N10ML	38L60ML	32F60ML	Units
	Plus Supply	60	100	600	600	V
V_{CER}	($R_{\text{ge}} = 20 \text{ K}\Omega$)	60	100	600	600	V
$I_{\text{C}} @ T_{\text{C}} = 25^{\circ}\text{C}$	Continuous Drain Current	75	60	76	60	A
$I_{\text{C}} @ T_{\text{J}} = 100^{\circ}\text{C}$	Continuous Drain Current	65	45	38	32	A
I_{C} Pulsed	Pulsed Drain Current ¹	225	225	152	120	A
Junction-To-Case	Linear Derating Factor	1.0	1.67	1.0	1.0	W/ $^{\circ}\text{C}$
Junction-To-Ambient	Linear Derating Factor	.02	.02	.02	.02	W/ $^{\circ}\text{C}$
R_{thJC}	Junction-To-Case	1.0	.60	1.0	1.0	$^{\circ}\text{C}/\text{W}$
R_{thJA}	Junction-To-Ambient	50	50	50	50	$^{\circ}\text{C}/\text{W}$

Rectifier

PIV	60	100	600	600	V
I_o	75	60	38	32	A
t_{rr}	35	50	35	35	nsec

MECHANICAL OUTLINE (LP-8)



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