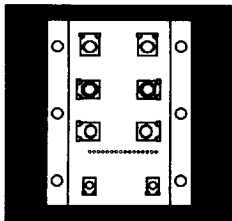


H-BRIDGE, MULTI-CHIP MODULES IN AN INDUSTRIAL ISOLATED PACKAGE



60 To 600 Volt, 50 To 150 Amp Modules,
H-Bridge Configuration

FEATURES

- Isolated Heat Sink
- Low Inductance Design
- Fast Switching Speed
- Low On Voltage
- Easy-To-Connect To Package

DESCRIPTION

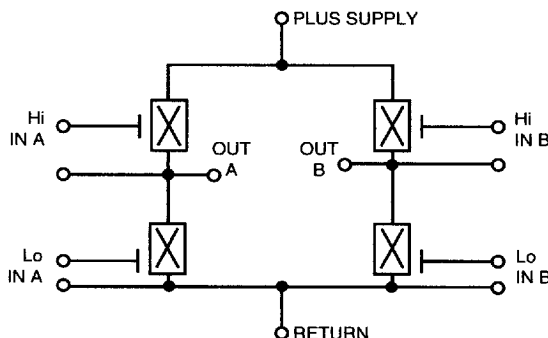
These modules are ideally suited for high density, high reliability switching applications such as Motion Control, UPS and high power SMPS. These multi-chip modules incorporate in one package the power semiconductors preconnected in an H-Bridge configuration.

GENERAL CHARACTERISTICS (Per Switch) @ 25°C

Part Number	Power Device	Voltage (V)*	Current (A)	$R_{DS(on)}$ or $V_{CE(sat)}$	Fall Time
OMS150N06FL	MOSFET	60	150	8 m ohms	-
OMS120N10FL	MOSFET	100	120	16 m ohms	-
OMS60L60FL	IGBT	600	75	1.8 Volts	1 μ s
OMS50F60FL	IGBT	600	75	2.7 Volts	500 ns

*Other voltages available.

SCHEMATIC



Note: IGBT's have anti-parallel diodes included.

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ELECTRICAL CHARACTERISTICS: OMS150N06FL/Per Switch ($T_C = 25^\circ$ unless otherwise specified)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS					
Drain-Source Breakdown Voltage, $I_D = 500 \mu A$, $V_{GS} = 0$	V_{BRDSS}	60	-	-	V
Zero Gate Voltage Drain Current = $V_{DS} = V_{GS} = \text{Max. Rat.}$	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}	-	-	± 200	nA

ON CHARACTERISTICS

Gate-Threshold Voltage, $V_{DS} = V_{GS}$, $I_D = 500 \mu A$	$V_{GS(TH)}$	2.0	-	4.0	V
Static Drain-Source On-Resistance, $V_{GS} = 10$ Vdc, $I_D = 10$ A	$R_{DS(on)}$	-	-	8	m Ω
$T_J = 100^\circ C$		-	-	16	m Ω

DYNAMIC CHARACTERISTICS

Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)}$ Max., $I_D = 60$ A $V_{DS} = 25$ V, $V_{GS} = 0$, $f = 1.0$ MHz	g_{fs}	30	-	-	mho
Input Capacitance		C_{iss}	-	6000	-	pF
Output Capacitance		C_{oss}	-	2000	-	pF
Reverse Transfer Capacitance		C_{res}	-	400	-	pF

SWITCHING CHARACTERISTICS

Turn-On Delay Time	$V_{DS} = 30$ V, $I_D = 150$ A, $R_{DS} = 9.1 \Omega$, $V_{GS} = 10$ V	$t_{d(on)}$	-	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	$I_{SD} = 150$ A, $V_{GS} = 0$, $I_{SD} = 13$ A, $di/dt = 100$ A/ μ Sec	I_{SD}	-	-	150	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}	-	20	-	μC

ELECTRICAL CHARACTERISTICS: OMS120N10FL/Per Switch ($T_C = 25^\circ$ unless otherwise specified)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS					
Drain-Source Breakdown Voltage, $I_D = 500 \mu A$, $V_{GS} = 0$	V_{BRDSS}	100	-	-	V
Zero Gate Voltage Drain Current = $V_{DS} = V_{GS} = \text{Max. Rat.}$	I_{DSS}	-	-	500	μA
$V_{DS} = \text{Max. Rat.} \times 0.8$, $T_J = 125^\circ C$		-	-	2000	μA
Gate-Body Leakage, $V_{GS} = \pm 20$ V	I_{GSS}	-	-	± 200	nA

ON CHARACTERISTICS

Gate-Threshold Voltage, $V_{DS} = V_{GS}$, $I_D = 500 \mu A$	$V_{GS(TH)}$	2.0	-	4.0	V
Static Drain-Source On-Resistance, $V_{GS} = 10$ Vdc, $I_D = 10$ A	$R_{DS(on)}$	-	-	16	m Ω
$T_J = 100^\circ C$		-	-	32	m Ω

DYNAMIC CHARACTERISTICS

Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)}$ Max., $I_D = 60$ A $V_{DS} = 25$ V, $V_{GS} = 0$, $f = 1.0$ MHz	g_{fs}	50	-	-	mho
Input Capacitance		C_{iss}	-	8000	-	pF
Output Capacitance		C_{oss}	-	2400	-	pF
Reverse Transfer Capacitance		C_{res}	-	600	-	pF

SWITCHING CHARACTERISTICS

Turn-On Delay Time	$V_{DS} = 80$ V, $I_D = 60$ A, $R_{DS} = 50 \Omega$, $V_{GS} = 10$ 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	$I_{SD} = 120$ A, $V_{GS} = 0$, $I_{SD} = 13$ A, $di/dt = 100$ A/ μ Sec	I_{SD}	-	-	120	A
Source - Drain Current (Pulsed)		I_{SDM}^*	-	-	480	A
Forward On-Voltage		V_{SD}	-	-	1.6	V
Reverse Recovery Time		t_{rr}	-	180	-	ns
Reverse Recovered Charge		Q_{rr}	-	4	-	μC

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

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ELECTRICAL CHARACTERISTICS: OMS60L60FL/Per Switch ($T_C = 25^\circ$ unless otherwise specified)

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

ON CHARACTERISTICS

Gate-Threshold Voltage, $V_{CE} = V_{GE}$, $I_D = 0.25 \text{ mA}$	$V_{GE(TH)}$	2.5	-	5.0	V
Collector Emitter Saturation Voltage, $V_{GE} = 15 V$, $I_C = 60 A$, $T_J = 25^\circ C$	$V_{CE(SAT)}$	-	-	1.8	V

DYNAMIC CHARACTERISTICS

Forward Transconductance	$V_{CE} = 10 V$, $I_C = 60 A$	g_{fs}	30	-	-	mho
Input Capacitance	$V_{GE} = 0$	C_{iss}	-	4000	-	pF
Output Capacitance	$V_{CE} = 25 V$	C_{oss}	-	350	-	pF
Reverse Transfer Capacitance	$f = 1.0 \text{ MHz}$	C_{rss}	-	100	-	pF

SWITCHING CHARACTERISTICS

Turn-On Delay Time	$V_{CC} = 480 V$, $I_C = 60 A$, $R_{GS} = 2.7 \Omega$, $V_{GE} = 15 V$	t_{on}	-	50	-	ns
Rise Time		t_r	-	200	-	ns
Turn-Off Delay Time		t_{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	-	-	200	μA
	$V_R = 480 V$, $T_J = 125^\circ C$		-	-	14	
Reverse Recovery Time	$I_F = 1 A$, $di/dt = 200 A/\mu S$, $V_R = 30 V$, $T_J = 25^\circ C$	t_{rr}	-	-	50	nS

ELECTRICAL CHARACTERISTICS: OMS50F60FL/Per Switch ($T_C = 25^\circ$ unless otherwise specified)

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

ON CHARACTERISTICS

Gate-Threshold Voltage, $V_{CE} = V_{GE}$, $I_D = 0.25 \text{ mA}$	$V_{GE(TH)}$	2.5	-	5.0	V
Collector Emitter Saturation Voltage, $V_{GE} = 15 V$, $I_C = 50 A$, $T_J = 25^\circ C$	$V_{CE(SAT)}$	-	-	2.7	V

DYNAMIC CHARACTERISTICS

Forward Transconductance	$V_{CE} = 10 V$, $I_C = 50 A$	g_{fs}	25	-	-	mho
Input Capacitance	$V_{GE} = 0$	C_{iss}	-	4000	-	pF
Output Capacitance	$V_{CE} = 25 V$	C_{oss}	-	350	-	pF
Reverse Transfer Capacitance	$f = 1.0 \text{ MHz}$	C_{rss}	-	100	-	pF

SWITCHING CHARACTERISTICS

Turn-On Delay Time	$V_{CC} = 480 V$, $I_C = 50 A$, $R_{GS} = 2.7 \Omega$, $V_{GE} = 15 V$	t_{on}	-	50	-	ns
Rise Time		t_r	-	250	-	ns
Turn-Off Delay Time		t_{off}	-	300	-	ns
Fall Time		t_f	-	600	-	ns

SOURCE DRAIN DIODE CHARACTERISTICS

Maximum Forward Voltage	$I_F = 100 A$, $T_C = 25^\circ C$	V_F	-	-	1.85	V
	$I_F = 100 A$, $T_J = 125^\circ C$		-	-	1.5	
Maximum Reverse Current	$V_R = 600 V$, $T_C = 25^\circ C$	I_R	-	-	200	μA
	$V_R = 480 V$, $T_J = 125^\circ C$		-	-	14	
Reverse Recovery Time	$I_F = 1 A$, $di/dt = 200 A/\mu S$, $V_R = 30 V$, $T_J = 25^\circ C$	t_{rr}	-	-	50	nS

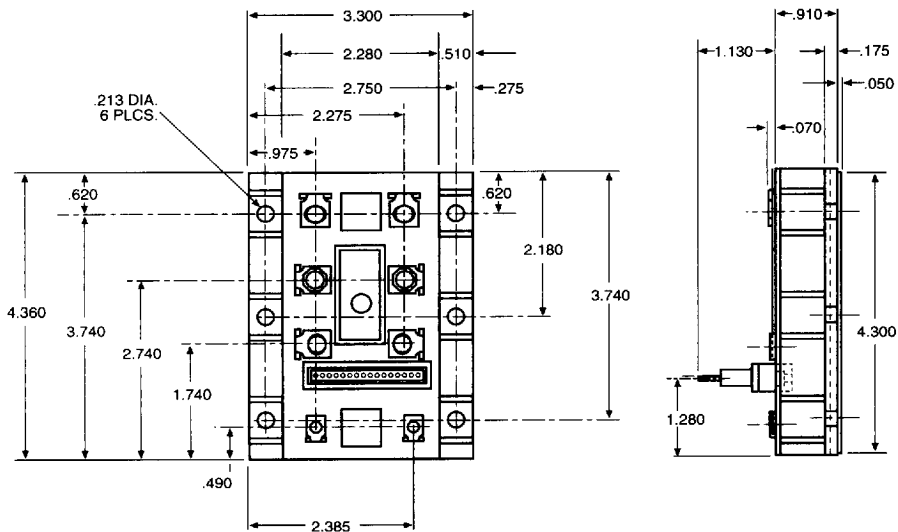
ABSOLUTE MAXIMUM RATINGS Per Switch ($T_C = 25^\circ\text{C}$ unless otherwise noted)
IGBT / MOSFET

Parameters		150N06FL	120N10FL	60L60FL	50F60FL	Units
Plus Supply		60	100	600	600	V
V_{CER}	($R_{\text{ge}} = 20 \text{ K}\Omega$)	60	100	600	600	V
$I_C @ T_C = 25^\circ\text{C}$	Continuous Drain Current	150	120	75	75	A
$I_C @ T_J = 100^\circ\text{C}$	Continuous Drain Current	130	90	60	50	A
I_C Pulsed	Pulsed Drain Current ¹	450	450	200	200	A
Junction-To-Case	Linear Derating Factor	1.0	1.67	1.67	1.67	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	.60	.60	$^\circ\text{C/W}$
R_{thJA}	Junction-To-Ambient	50	50	50	50	$^\circ\text{C/W}$

Rectifier

PIV		60	100	600	600	V
I_O		150	120	60	50	A
t_{rr}		50	180	35	35	nsec

MECHANICAL OUTLINE (LP-8)



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