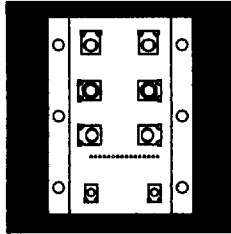


H-BRIDGE, MULTI-CHIP MODULES IN AN INDUSTRIAL ISOLATED PACKAGE



60 To 600 Volt, 50 To 150 Amp Modules With Internal Gate Drive, H-Bridge Configuration

FEATURES

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

DESCRIPTION

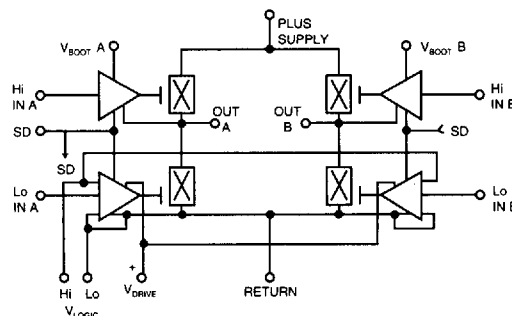
These modules are ideally suited for high density, high reliability switching applications such as Motion Control, UPS and high power SMPS. These multi-chip modules incorporate in one package both the power semiconductors and the gate drive circuitry.

GENERAL CHARACTERISTICS (Per Switch) @ 25°C

Part Number	Power Device	Voltage (V)*	Current (A)	$R_{DS(on)}$ or $V_{CE(sat)}$	Fall Time
OMD150N06FL	MOSFET	60	150	8 m ohms	-
OMD120N10FL	MOSFET	100	120	16 m ohms	-
OMD60L60FL	IGBT	600	75	1.8 Volts	1 μ s
OMD50F60FL	IGBT	600	75	2.7 Volts	500 ns

*Other voltages available.

SCHEMATIC



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

ELECTRICAL CHARACTERISTICS: OMD150N06FL/Per Switch ($T_C = 25^\circ\text{C}$ unless otherwise specified)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS					
Drain-Source Breakdown Voltage, $I_D = 500\ \mu\text{A}$, $V_{GS} = 0$	$V_{(BR)DSS}$	60	-	-	V
Zero Gate Voltage Drain Current = V_{GS} , $V_{DS} = \text{Max. Rat.}$	I_{DSS}	-	-	25	μA
$V_{DS} = \text{Max. Rat.} \times 0.8$, $T_J = 125^\circ\text{C}$		-	-	250	μA

ON CHARACTERISTICS

Static Drain-Source On-Resistance, $V_{GS} = 10\ \text{Vdc}$, $I_D = 10\ \text{A}$ $T_J = 100^\circ\text{C}$	$R_{DS(on)}$	-	-	8	$\text{m}\Omega$
		-	-	16	$\text{m}\Omega$

DYNAMIC CHARACTERISTICS

Output Capacitance	$V_{DS} = 25\ \text{V}$, $V_{GS} = 0$, $f = 1.0\ \text{MHz}$	C_{oss}	-	2000	-	pF
Reverse Transfer Capacitance		C_{rss}	-	400	-	pF

SWITCHING CHARACTERISTICS

Turn-On Delay Time	$V_{DD} = 30\ \text{V}$, $I_D = 150\ \text{A}$	$t_{d(on)}$	-	1000	-	ns
Rise Time		t_r	-	500	-	ns
Turn-Off Delay Time		$t_{d(off)}$	-	1000	-	ns
Fall Time		t_f	-	250	-	ns

SOURCE DRAIN DIODE CHARACTERISTICS

Forward On-Voltage	$I_{SD} = 150\ \text{A}$, $V_{GS} = 0$	V_{SD}	-	-	1.1	V
Reverse Recovery Time		t_{rr}	-	50	-	ns
Reverse Recovered Charge		Q_{rr}	-	.2	-	μC

ELECTRICAL CHARACTERISTICS: OMD120N10FL/Per Switch ($T_C = 25^\circ\text{C}$ unless otherwise specified)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS					
Drain-Source Breakdown Voltage, $I_D = 500\ \mu\text{A}$, $V_{GS} = 0$	$V_{(BR)DSS}$	100	-	-	V
Zero Gate Voltage Drain Current = V_{GS} , $V_{DS} = \text{Max. Rat.}$	I_{DSS}	-	-	500	μA
$V_{DS} = \text{Max. Rat.} \times 0.8$, $T_C = 70^\circ\text{C}$		-	-	2000	μA

ON CHARACTERISTICS

Static Drain-Source On-Resistance, $V_{GS} = 10\ \text{Vdc}$, $I_D = 10\ \text{A}$ $T_C = 70^\circ\text{C}$	$R_{DS(on)}$	-	-	16	$\text{m}\Omega$
		-	-	32	$\text{m}\Omega$

DYNAMIC CHARACTERISTICS

Output Capacitance	$V_{DS} = 25\ \text{V}$, $V_{GS} = 0$, $f = 1.0\ \text{MHz}$	C_{oss}	-	2400	-	pF
Reverse Transfer Capacitance		C_{rss}	-	600	-	pF

SWITCHING CHARACTERISTICS

Turn-On Delay Time	$V_{DD} = 80\ \text{V}$, $I_D = 60\ \text{A}$ $R_{GS} = 50\ \Omega$, $V_{GS} = 10\ \text{V}$	$t_{d(on)}$	-	1000	-	ns
Rise Time		t_r	-	300	-	ns
Turn-Off Delay Time		$t_{d(off)}$	-	1000	-	ns
Fall Time		t_f	-	250	-	ns

SOURCE DRAIN DIODE CHARACTERISTICS

Forward On-Voltage	$I_{SD} = 120\ \text{A}$, $V_{GS} = 0$, $di/dt = 100\ \text{A}/\mu\text{Sec}$	V_{SD}	-	-	1.6	V
Reverse Recovery Time		t_{rr}	-	180	-	ns
Reverse Recovered Charge		Q_{rr}	-	4	-	μC

ELECTRICAL CHARACTERISTICS: OMD60L60FL/Per Switch ($T_C = 25^\circ\text{C}$ unless otherwise specified)

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

ON CHARACTERISTICS

Collector Emitter Saturation Voltage, $V_{GE} = 15\ \text{V}$, $I_C = 60\ \text{A}$, $T_C = 25^\circ\text{C}$	$V_{CE(sat)}$	-	-	1.8	V
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DYNAMIC CHARACTERISTICS

Output Capacitance	$V_{GE} = 0\ \text{V}$, $V_{CE} = 25\ \text{V}$	C_{oss}	-	350	-	pF
Reverse Transfer Capacitance	$f = 1.0\ \text{MHz}$	C_{rss}	-	100	-	pF

SWITCHING CHARACTERISTICS

Turn-On Delay Time	$V_{CC} = 480\ \text{V}$, $I_C = 60\ \text{A}$ $V_{GE} = 15\ \text{V}$	$t_{d(on)}$	-	1000	-	ns
Rise Time		t_r	-	250	-	ns
Turn-Off Delay Time		$t_{d(off)}$	-	1000	-	ns
Fall Time		t_f	-	500	-	ns

SOURCE DRAIN DIODE CHARACTERISTICS

Maximum Forward Voltage	$I_F = 60\ \text{A}$, $T_C = 25^\circ\text{C}$	V_F	-	-	1.85	V
	$I_F = 60\ \text{A}$, $T_J = 125^\circ\text{C}$		-	-	1.5	
Maximum Reverse Current	$V_R = 600\ \text{V}$, $T_C = 25^\circ\text{C}$	I_R	-	-	200	μA
	$V_R = 480\ \text{V}$, $T_J = 125^\circ\text{C}$		-	-	14	mA
Reverse Recovery Time	$I_F = 1\ \text{A}$, $di/dt = 200\ \text{A}/\mu\text{S}$ $V_R = 30\ \text{V}$, $T_J = 25^\circ\text{C}$	t_{rr}	-	-	50	nS

ELECTRICAL CHARACTERISTICS: OMD150F60ML/Per Switch ($T_C = 25^\circ\text{C}$ unless otherwise specified)

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

ON CHARACTERISTICS

Collector Emitter Saturation Voltage, $V_{GE} = 15\ \text{V}$, $I_C = 50\ \text{A}$, $T_C = 25^\circ\text{C}$	$V_{CE(sat)}$	-	-	2.7	V
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DYNAMIC CHARACTERISTICS

Output Capacitance	$V_{GE} = 0\ \text{V}$, $V_{CE} = 25\ \text{V}$	C_{oss}	-	350	-	pF
Reverse Transfer Capacitance	$f = 1.0\ \text{MHz}$	C_{rss}	-	100	-	pF

SWITCHING CHARACTERISTICS

Turn-On Delay Time	$V_{CC} = 480\ \text{V}$, $I_C = 50\ \text{A}$ $V_{GE} = 15\ \text{V}$	$t_{d(on)}$	-	1000	-	ns
Rise Time		t_r	-	200	-	ns
Turn-Off Delay Time		$t_{d(off)}$	-	1000	-	ns
Fall Time		t_f	-	300	-	ns

SOURCE DRAIN DIODE CHARACTERISTICS

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

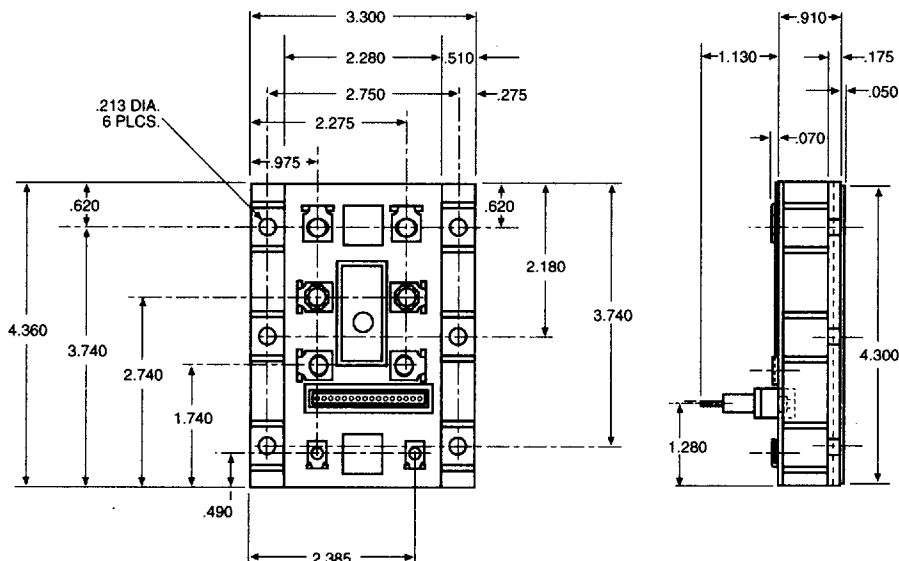
Rectifier

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

Gate Driver

V_{DD}	Either Chip	18	18	18	18	V
V_{LSD} to V_{HSD}		75	100	500	500	V
Logic Input Voltage		-0.3 to V_L	-0.3 to V_L	-0.3 to V_L	-0.3 to V_L	V
T_J		150	150	150	150	$^\circ\text{C}$

MECHANICAL OUTLINE (LP-8)



2.1