



1000 Volt, 5 To 25 Amp, N-Channel IGBTs With Free Wheeling Diodes In Multi-Chip Packages



FEATURES

- Two Or Four IGBTs And Free Wheeling Diodes
- 2500V Package Isolation
- Low Turn-Off Switching Losses
- 3.5V Typical $V_{ce(sat)}$
- 50nS Soft Recovery Diode

APPLICATIONS

- Half And Full Bridge
- AC/DC Motor Control
- Switch Mode Power Supply
- Induction Heating

DESCRIPTION

This series of 1000 Volt, 5 Amp to 25 Amp IGBT power modules feature the latest direct bonded copper technology (DBC) providing optimum thermal management as well as component isolation. These devices feature the free wheeling diode mounted in close proximity with the IGBT and are available in both dual and quad configurations.

IGBT	Maximum Ratings (Per Device)	OM6555	OM6556	Units
$I_C @ T_C = 25^\circ\text{C}$	Continuous Collector Current	10	21	A
$I_C @ T_C = 85^\circ\text{C}$	Continuous Collector Current	5	10	A
$V_{(BR)CES}$	Collector to Emitter Breakdown Voltage	1000	1000	V
V_{GE}	Gate to Emitter Voltage	± 20	± 20	V
$P_D @ T_C = 25^\circ\text{C}$	Maximum Power Dissipation	35	68	W
$P_D @ T_C = 85^\circ\text{C}$	Maximum Power Dissipation	16	55	W
T_J, T_{ISg}	Operating and Storage Temperature	-40 to 150	-40 to 150	$^\circ\text{C}$

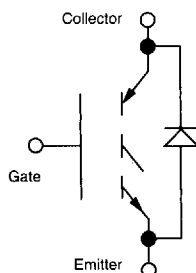
Diode

V_{rm}	Peak Repetitive Reverse Voltage	1000	1000	V
$I_{F(AV)} @ T_C = 25^\circ\text{C}$	Average Rectified Forward Current	8	30	A
$I_{F(AV)} @ T_C = 85^\circ\text{C}$	Average Rectified Forward Current	5	19	A
T_J, T_{ISg}	Operating and Storage Temperature	-40 to 150	-40 to 150	$^\circ\text{C}$

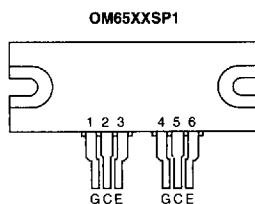
Module Thermal Characteristics

$R\theta_{JC}, \text{IGBT}$	Thermal Resistance, Junction-to-Case	1.7	1.7	$^\circ\text{C/W}$
$R\theta_{JC}, \text{Diode}$	Thermal Resistance, Junction-to-Case	4	2.6	$^\circ\text{C/W}$
$R\theta_{CS}, \text{Module}$	Thermal Resistance, Case-to-Sink (1)	0.1	0.1	$^\circ\text{C/W}$

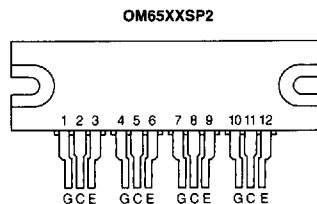
SCHEMATIC



PIN CONNECTIONS



Pin 1, 4: Gate
Pin 2, 5: Collector
Pin 3, 6: Emitter



Pin 1, 4, 7, 10: Gate
Pin 2, 5, 8, 11: Collector
Pin 3, 6, 9, 12: Emitter

OM6555SP1/OM6555SP2**IGBT CHARACTERISTICS ($T_j = 25^\circ\text{C}$ unless otherwise specified)****Parameter - OFF**

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$V_{(BR)CES}$	Collector to Emitter Breakdown Voltage	1000			V	$V_{GE} = 0$ $I_C = 250 \mu\text{A}$
I_{CES}	Zero Gate Voltage Drain Current			0.25 1	mA mA	$V_{CE} = \text{Max. Rat.}, V_{GE} = 0$ $V_{CE} = 0.8 \text{ Max. Rat.}, V_{GE} = 0$ $T_j = 150^\circ\text{C}$
I_{GES}	Gate Emitter Leakage Current			± 100	nA	$V_{GE} = \pm 20 \text{ V}$ $V_{CE} = 0 \text{ V}$

Parameter - ON

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$V_{GE(th)}$	Gate Threshold Voltage	4.5		6.5	V	$V_{CE} = V_{GE}, I_C = 1 \text{ mA}$
$V_{CE(sat)}$	Collector Emitter Saturation Voltage		3.5		V	$V_{GE} = 15 \text{ V}, I_C = 10 \text{ A}$
$V_{CE(sat)}$	Collector Emitter Saturation Voltage			3.8	V	$V_{GE} = 15 \text{ V}, I_C = 5 \text{ A}$ $T_j = 150^\circ\text{C}$

Dynamic

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
G_{fs}	Forward Transconductance		1.7		S	$V_{CE} = 20 \text{ V}, I_C = 15 \text{ A}$
C_{iss}	Input Capacitance		650		pF	$V_{GE} = 0$
C_{oss}	Output Capacitance		50		pF	$V_{CE} = 25 \text{ V}$
C_{res}	Reverse Transfer Capacitance		20		pF	$f = 1 \text{ MHz}$
$T_{d(on)}$	Turn-On Delay Time		50		nS	$V_{CC} = 600 \text{ V}, I_C = 15 \text{ A}$ $V_{GE} = 15 \text{ V}$ $R_g = 3.3 \Omega$ $L = .1 \text{ mH}$ $T_j = 150^\circ\text{C}$
T_r	Rise Time		200		nS	
$T_{d(off)}$	Turn-Off Delay Time		200		nS	
T_f	Fall Time		300		nS	
E_{is}	Turn-Off Switching Losses		2.4		mJ	

DIODE CHARACTERISTICS ($T_j = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
V_f	Maximum Forward Voltage			1.9 1.7	V V	$I_F = 8 \text{ A}, T_j = 25^\circ\text{C}$ $I_F = 5 \text{ A}, T_j = 150^\circ\text{C}$
I_r	Maximum Reverse Current			1.2 2.5	mA mA	$V_R = 1000 \text{ V}, T_j = 25^\circ\text{C}$ $V_R = 800 \text{ V}, T_j = 150^\circ\text{C}$
T_{rr}	Reverse Recovery Time			135	nS	$I_F = 1 \text{ A}, d_i/d_t = -15 \text{ A}/\mu\text{S}$ $V_R = 30 \text{ V}, T_j = 25^\circ\text{C}$

OM6556SP1/OM6556SP2**IGBT CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise specified)****Parameter - OFF**

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$V_{(BR)CES}$	Collector to Emitter Breakdown Voltage	1000			V	$V_{GE} = 0$ $I_C = 250\ \mu\text{A}$
I_{CES}	Zero Gate Voltage Drain Current			0.25	mA	$V_{CE} = \text{Max. Rat.}, V_{GE} = 0$
				1	mA	$V_{CE} = 0.8 \text{ Max. Rat.}, V_{GE} = 0$ $T_J = 150^\circ\text{C}$
I_{GES}	Gate Emitter Leakage Current			± 100	nA	$V_{GE} = \pm 20\ \text{V}$ $V_{CE} = 0\ \text{V}$

Parameter - ON

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$V_{GE(th)}$	Gate Threshold Voltage	4.5		6.5	V	$V_{CE} = V_{GE}, I_C = 1\ \text{mA}$
$V_{CE(sat)}$	Collector Emitter Saturation Voltage		3.5		V	$V_{GE} = 15\ \text{V}, I_C = 21\ \text{A}$
$V_{CE(sat)}$	Collector Emitter Saturation Voltage			3.8	V	$V_{GE} = 15\ \text{V}, I_C = 10\ \text{A}$ $T_J = 150^\circ\text{C}$

Dynamic

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
G_{fs}	Forward Transconductance		1.7		S	$V_{CE} = 20\ \text{V}, I_C = 15\ \text{A}$
C_{iss}	Input Capacitance		650		pF	$V_{GE} = 0$
C_{oss}	Output Capacitance		50		pF	$V_{CE} = 25\ \text{V}$
C_{res}	Reverse Transfer Capacitance		20		pF	$f = 1\ \text{MHz}$
$T_{d(on)}$	Turn-On Delay Time		50		nS	$V_{CC} = 600\ \text{V}, I_C = 10\ \text{A}$ $V_{GE} = 15\ \text{V}$ $R_g = 3.3\ \Omega$ $L = .1\ \text{mH}$ $T_J = 150^\circ\text{C}$
T_r	Rise Time		200		nS	
$T_{d(off)}$	Turn-Off Delay Time		200		nS	
T_f	Fall Time		300		nS	
E_{ts}	Turn-Off Switching Losses		2.4		mJ	

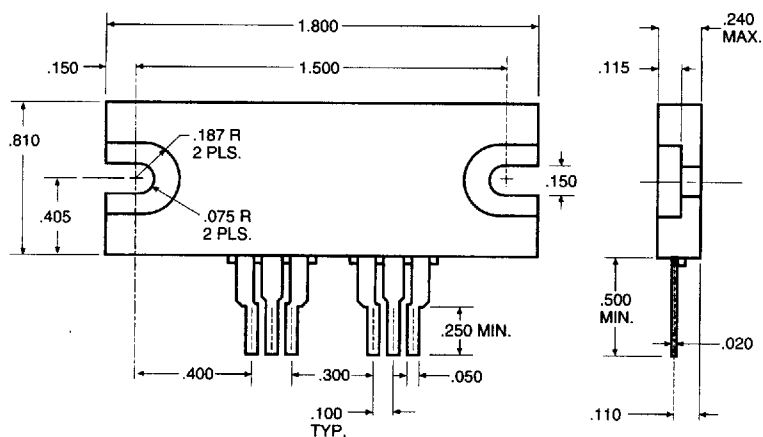
DIODE CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
V_f	Maximum Forward Voltage			1.9	V	$I_F = 8\ \text{A}, T_J = 25^\circ\text{C}$
				1.7	V	$I_F = 5\ \text{A}, T_J = 150^\circ\text{C}$
I_r	Maximum Reverse Current			1.2	mA	$V_R = 1000\ \text{V}, T_J = 25^\circ\text{C}$
				2	mA	$V_R = 800\ \text{V}, T_J = 150^\circ\text{C}$
T_{rr}	Reverse Recovery Time			135	nS	$I_F = 1\ \text{A}, d_i/d_t = -15\ \text{A}/\mu\text{S}$ $V_R = 30\ \text{V}, T_J = 25^\circ\text{C}$

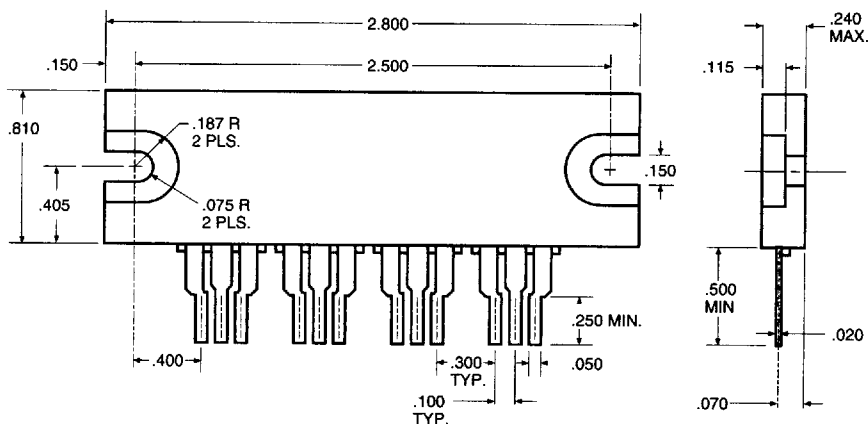
2.1

Mechanical Outlines

Omnirel Package P-1 (Industrial 6-Pin)



Omnirel Package P-2 (Industrial 12-Pin)



Mechanical Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
Torque	Mounting Torque $\pm 10\%$		10.5 6		Nm in/lbs	Package to heat sink (1, 2)
wt	Approximate Weight		0.8 17		g oz	SP1 Package
			1.3 28		g oz	SP2 Package

Notes:

1. Mounting surface flat, smooth, and greased. Recommended mounting compound Dow Corning DC340
2. Mount using two #6 size screws with flat washers (.375" OD, .188" ID, .040" Thickness)