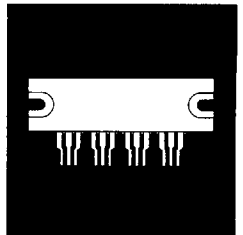


500 Volt And 1000 Volt, 5 To 25 Amp, N-Channel IGBTs In Multi-Chip Packages



FEATURES

- Two Or Four Uncommitted IGBT's
- 2500V Isolated Packages
- Low Turn-Off Switching Losses
- 3.5V Typical $V_{CE(sat)}$

APPLICATIONS

- AC Solid State Relays
- Push-Pull Converters
- Audio Amplifier Output Stage
- Strobe Power Stage

DESCRIPTION

This series of 500 Volt and 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 are available in both dual and quad configurations.

MAXIMUM RATINGS FOR IGBTs (Per Device)

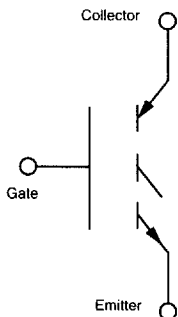
		500V			1000V			Units
		OM6543	OM6544	OM6545	OM6557	OM6558	OM6559	
$I_C @ T_C = 25^\circ C$	Continuous Collector Current	10	26	49	10	21	25	A
$I_C @ T_C = 85^\circ C$	Continuous Collector Current	5	12	25	5	10	15	A
$V_{(BR)CES}$	Collector to Emitter Breakdown Voltage	500	500	500	1000	1000	1000	V
V_{GE}	Gate to Emitter Voltage	± 20	± 20	± 20	± 20	± 20	± 20	V
$P_D @ T_C = 25^\circ C$	Maximum Power Dissipation	35	68	147	35	68	80	W
$P_D @ T_C = 85^\circ C$	Maximum Power Dissipation	16	36	75	16	55	55	W
T_J, T_{stg}	Operating and Storage Temperature	-40 to 150	-40 to 150	-40 to 150	-40 to 150	-40 to 150	-40 to 150	$^\circ C$

2.1

MODULE THERMAL CHARACTERISTICS

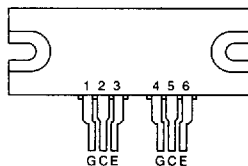
$R\theta_{JC}$, IGBT	Thermal Resistance, Junction-to-Case	4	1.2	0.85	1.7	1.7	1.2	$^\circ C/W$
$R\theta_{CS}$, Module	Thermal Resistance, Case-to-Sink (1)	0.1	0.1	0.1	0.1	0.1	0.1	$^\circ C/W$

SCHEMATIC



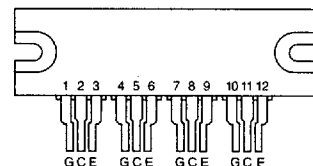
PIN CONNECTIONS

OM65XXSP1



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

OM65XXSP2



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

6789073 0001132 875

OM6543SP1/OM6543SP2IGBT 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	500			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	2		4	V	$V_{CE} = V_{GE}, I_C = 1 \text{ mA}$
$V_{CE(sat)}$	Collector Emitter Saturation Voltage		3.2		V	$V_{GE} = 15 \text{ V}, I_C = 10 \text{ A}$
$V_{CE(sat)}$	Collector Emitter Saturation Voltage			3	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		2		S	$V_{CE} = 20 \text{ V}, I_C = 5 \text{ A}$
C_{iss}	Input Capacitance		260		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		37		nS	$V_{CC} = 400 \text{ V}, I_C = 5 \text{ A}$ $V_{GE} = 15 \text{ V}$ $R_g = 47 \Omega$ $L = .1 \text{ mH}$ $T_j = 150^\circ\text{C}$
T_r	Rise Time		150		nS	
$T_{d(off)}$	Turn-Off Delay Time		350		nS	
T_f	Fall Time		810		nS	
E_{ts}	Turn-Off Switching Losses		0.95		mJ	

2.1

OM6544SP1/OM6544SP2IGBT 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	500			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	2		4	V	$V_{CE} = V_{GE}, I_C = 1 \text{ mA}$
$V_{CE(sat)}$	Collector Emitter Saturation Voltage		2.6		V	$V_{GE} = 15 \text{ V}, I_C = 26 \text{ A}$
$V_{CE(sat)}$	Collector Emitter Saturation Voltage			3	V	$V_{GE} = 15 \text{ V}, I_C = 12 \text{ A}$ $T_J = 150^\circ\text{C}$

Dynamic

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
G_{fs}	Forward Transconductance		6		S	$V_{CE} = 20 \text{ V}, I_C = 10 \text{ A}$
C_{iss}	Input Capacitance		980		pF	$V_{GE} = 0$
C_{oss}	Output Capacitance		106		pF	$V_{CE} = 25 \text{ V}$
C_{res}	Reverse Transfer Capacitance		30		pF	$f = 1 \text{ MHz}$
$T_{d(on)}$	Turn-On Delay Time		56		nS	$V_{CC} = 400 \text{ V}, I_C = 10 \text{ A}$ $V_{GE} = 15 \text{ V}$ $R_\theta = 47 \Omega$ $L = .1 \text{ mH}$ $T_J = 150^\circ\text{C}$
T_r	Rise Time		115		nS	
$T_{d(off)}$	Turn-Off Delay Time		170		nS	
T_f	Fall Time		300		nS	
E_{is}	Turn-Off Switching Losses		1		mJ	

2.1

OM6545SP1/OM6545SP2

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	500			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	2		4	V	$V_{CE} = V_{GE}, I_C = 1\text{mA}$
$V_{CE(sat)}$	Collector Emitter Saturation Voltage		2.6		V	$V_{GE} = 15 \text{ V}, I_C = 50 \text{ A}$
$V_{CE(sat)}$	Collector Emitter Saturation Voltage			3	V	$V_{GE} = 15 \text{ V}, I_C = 25 \text{ A}$ $T_j = 150^\circ\text{C}$

Dynamic

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
G_{fs}	Forward Transconductance		6		S	$V_{CE} = 20 \text{ V}, I_C = 10 \text{ A}$
C_{iss}	Input Capacitance		980		pF	$V_{GE} = 0$
C_{oss}	Output Capacitance		106		pF	$V_{CE} = 25 \text{ V}$
C_{res}	Reverse Transfer Capacitance		30		pF	$f = 1 \text{ MHz}$
$T_{d(on)}$	Turn-On Delay Time		56		nS	$V_{CC} = 400 \text{ V}, I_C = 10 \text{ A}$ $V_{GE} = 15 \text{ V}$ $R_g = 47 \Omega$ $L = .1 \text{ mH}$ $T_j = 150^\circ\text{C}$
T_r	Rise Time		115		nS	
$T_{d(off)}$	Turn-Off Delay Time		170		nS	
T_f	Fall Time		300		nS	
E_{is}	Turn-Off Switching Losses		1		mJ	

2.1

OM6557SP1/OM6557SP2IGBT 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	$V_{CC} = 600 \text{ V}, I_C = 5 \text{ A}$
T_r	Rise Time		200		nS	$V_{GE} = 15 \text{ V}$
$T_{d(off)}$	Turn-Off Delay Time		200		nS	$R_g = 3.3 \Omega$
T_f	Fall Time		300		nS	$L = .1 \text{ mH}$
E_{is}	Turn-Off Switching Losses		2.4		mJ	$T_j = 150^\circ\text{C}$

2.1

OM6558SP1/OM6558SP2

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	$V_{GE} = 15 \text{ V}, I_C = 21 \text{ A}$
$V_{CE(sat)}$	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	$V_{CC} = 600 \text{ V}, I_C = 10 \text{ A}$ $V_{GE} = 15 \text{ V}$ $R_{\theta} = 3.3 \Omega$ $L = .1 \text{ mH}$ $T_j = 150^\circ\text{C}$
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	

2.1

OM6559SP1/OM6559SP2IGBT 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	$V_{GE} = 15 \text{ V}, I_C = 25 \text{ A}$
$V_{CE(sat)}$	Collector Emitter Saturation Voltage			4.5	V	$V_{GE} = 15 \text{ V}, I_C = 15 \text{ A}$ $T_J = 150^\circ\text{C}$

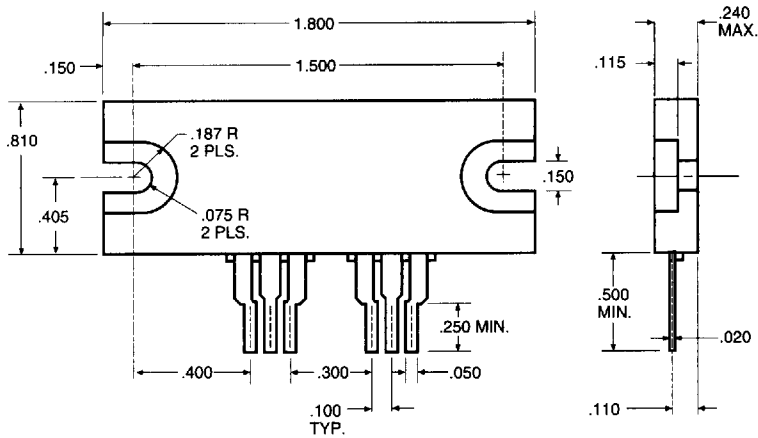
Dynamic

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
G_{fs}	Forward Transconductance		5.5		S	$V_{CE} = 20 \text{ V}, I_C = 15 \text{ A}$
C_{iss}	Input Capacitance		2000		pF	$V_{GE} = 0$
C_{oss}	Output Capacitance		160		pF	$V_{CE} = 25 \text{ V}$
C_{res}	Reverse Transfer Capacitance		65		pF	$f = 1 \text{ MHz}$
$T_{d(on)}$	Turn-On Delay Time		50		nS	$V_{CC} = 600 \text{ V}, I_C = 5 \text{ A}$ $V_{GE} = 15 \text{ V}$ $R_g = 3.3 \Omega$ $L = .1 \text{ mH}$ $T_J = 150^\circ\text{C}$
T_r	Rise Time		200		nS	
$T_{d(off)}$	Turn-Off Delay Time		200		nS	
T_f	Fall Time		200		nS	
E_{is}	Turn-Off Switching Losses		1.5		mJ	

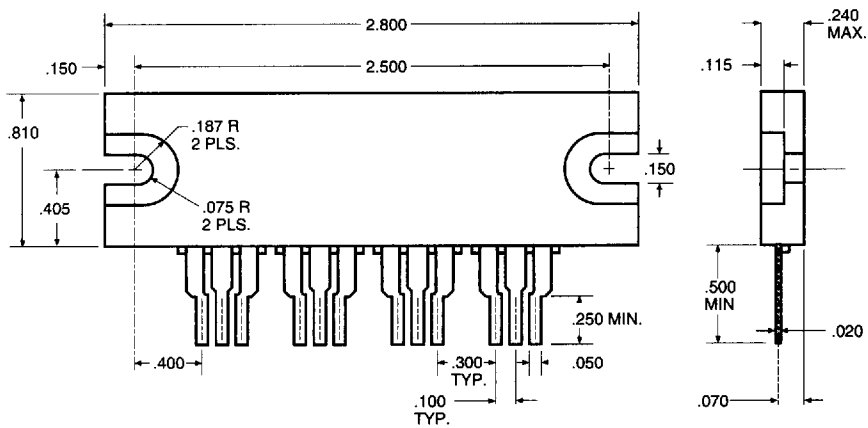
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Mechanical Outlines

Omnirel Package P-1 (Industrial 6-Pin)



Omnirel Package P-2 (Industrial 12-Pin)



2.1

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)

■ 6789073 0001139 12T ■