

500 And 1000 Volt, 30 And 25 Amp IGBT Module With Soft Recovery Rectifier, Half Bridge Configuration With Gate Drivers

- Hermetic Isolated Metal Package
- Includes Gate Drivers And Soft Recovery Rectifiers
- High Current And High Voltage
- Antiparallel Diode Protection
- Available Hi-Rel Screened

These IGBT modules are ideally suited for high density, high reliability switching applications such as frequency converters for 3~ motors, UPS and high power SMPS. These multi-chip modules incorporate in one package both the power IGBT's, soft recovery rectifiers and gate drive circuit in a half bridge configuration.

2.1

Per IGBT				Per Rectifier		
Part Number	I _C (Cont.) @ 90°C, A	V _{(BR)CES} V	V _{CE(sat)} @ 100°C, V	PIV V	I _O A	t _{rr} nsec
OM9034SF	30	500	3.0	600	30	35
OM9035SF	25	1000	4.0	1000	30	50

Pinout diagram for the 10-pin DIP package. The package is shown with pins numbered 1 to 10. Pins 1, 2, 3, 4, and 5 are on the bottom, and pins 6, 7, 8, 9, and 10 are on the top. The pin functions are listed below the diagram:

Pin 1: Output	Pin 6: +15V
Pin 2: Output	Pin 7: $\overline{\text{HS}}_{\text{in}}$
Pin 3: $V_{\text{Bootstrap}}$	Pin 8: LS_{in}
Pin 4: V_{CC}	Pin 9: Ground
Pin 5: V_{CC}	Pin 10: Ground

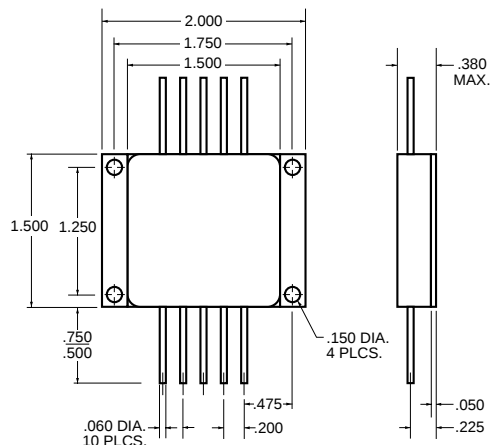
OM9034SF**IGBT CHARACTERISTICS - 500V**

Parameter - OFF (see Note 1)		Min.	Typ.	Max.	Units	Test Conditions
$V_{(BR)CES}$	Collector Emitter Breakdown Voltage	500			V	$V_{CE} = 0$ $I_C = 250 \mu A$
	I_{CES} Zero Gate Voltage Drain Current			0.25 1.0	mA mA	$V_{CE} = \text{Max. Rat.}, V_{GE} = 0$ $V_{CE} = 0.8 \text{ Max. Rat.}, V_{GE} = 0$ $T_C = 125^\circ C$
I_{GES}	Gate Emitter Leakage Current			± 100	nA	$V_{GE} = \pm 20 \text{ V}$ $V_{CE} = 0 \text{ V}$
Parameter - ON						
$V_{GE(th)}$	Gate Threshold Voltage	2.0		4.0	V	$V_{CE} = V_{GE}, I_C = 250 \mu A$
$V_{CE(sat)}$	Collector Emitter Saturation Voltage			2.5	V	$V_{GE} = 15 \text{ V}, I_C = 30 \text{ A}$ $T_C = 25^\circ C$
$V_{CE(sat)}$	Collector Emitter Saturation Voltage			2.5	V	$V_{GE} = 15 \text{ V}, I_C = 30 \text{ A}$ $T_C = 125^\circ C$
Dynamic						
g_{fs}	Forward Transductance	8.0			S	$V_{CE} = 15 \text{ V}, I_C = 30 \text{ A}$
C_{ies}	Input Capacitance			3500	pF	$V_{GE} = 0$
C_{oes}	Output Capacitance			250	pF	$V_{CE} = 25 \text{ V}$
C_{res}	Reverse Transfer Capacitance			50	pF	$f = 1 \text{ MHz}$
Switching-Resistive Load						
$T_{d(on)}$	Turn-On Time			100	nS	$V_{CC} = 400 \text{ V}, I_C = 30 \text{ A}$ $V_{GE} = 15 \text{ V}, R_g = 100$
t_r	Rise Time			200	nS	
$T_{d(off)}$	Turn-Off Delay Time			1.0	μS	
t_f	Fall Time			2.0	μS	
Switching-Inductive Load						
$T_{d(on)}$	Turn-On Delay Time			100	nS	$V_{CEclamp} = 400 \text{ V}, I_C = 30 \text{ A}$ $V_{GE} = 15 \text{ V}, R_g = 100$ $L = 0.1 \text{ mH}, T_J = 100^\circ C$
t_r	Rise Time			200	nS	
$T_{d(off)}$	Turn-Off Delay Time			1.0	nS	
t_f	Current Fall Time			3.0	μS	
DIODE CHARACTERISTICS						
V_f	Maximum Forward Voltage			1.35 1.15	V V	$I_F = 30 \text{ A}, T_C = 25^\circ C$ $I_F = 30 \text{ A}, T_C = 150^\circ C$
				500 7.0	μA mA	$V_R = 600 \text{ V}, T_C = 25^\circ C$ $V_R = 480 \text{ V}, T_C = 125^\circ C$
t_{rr}	Reverse Recovery Time			35	nS	$I_F = 1 \text{ A}, d_i / d_t = -15 \text{ A } \mu S$ $V_R = 30 \text{ V}, T_J = 25^\circ C$

Note 1: Limited by diode I_r characteristic.

OM9035SF**IGBT CHARACTERISTICS - 1000V**

Parameter - OFF (see Note 1)		Min.	Typ.	Max.	Units	Test Conditions
$V_{(BR)CES}$	Collector Emitter Breakdown Voltage	1000			V	$V_{CE} = 0$ $I_C = 250 \mu A$
I_{CES}	Zero Gate Voltage Drain Current			0.25	mA	$V_{CE} = \text{Max. Rat.}, V_{GE} = 0$
				1.0	mA	$V_{CE} = 0.8 \text{ Max. Rat.}, V_{GE} = 0$ $T_C = 125^\circ C$
I_{GES}	Gate Emitter Leakage Current			± 100	nA	$V_{GE} = \pm 20 \text{ V}$ $V_{CE} = 0 \text{ V}$
Parameter - ON						
$V_{GE(th)}$	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	$V_{GE} = 15 \text{ V}, I_C = 15 \text{ A}$ $T_C = 25^\circ C$
$V_{CE(sat)}$	Collector Emitter Saturation Voltage			4.5	V	$V_{GE} = 15 \text{ V}, I_C = 15 \text{ A}$ $T_C = 125^\circ C$
Dynamic						
g_{fs}	Forward Transductance	5.5			S	$V_{CE} = 20 \text{ V}, I_C = 15 \text{ A}$
C_{ies}	Input Capacitance		2000		pF	$V_{GE} = 0$
C_{oes}	Output Capacitance		160		pF	$V_{CE} = 25 \text{ V}$
C_{res}	Reverse Transfer Capacitance		65		pF	$f = 1 \text{ MHz}$
Switching-Resistive Load						
$T_{d(on)}$	Turn-On Time		50		nS	$V_{CC} = 600 \text{ V}, I_C = 15 \text{ A}$
t_r	Rise Time		200		nS	$V_{GE} = 15 \text{ V}, R_g = 3.3 \text{ } ,$
$T_{d(off)}$	Turn-Off Delay Time		200		nS	$T_J = 125^\circ C$
t_f	Fall Time		300		nS	
Switching-Inductive Load						
$T_{d(off)}$	Turn-Off Delay Time		200		nS	$V_{CEclamp} = 600 \text{ V}, I_C = 15 \text{ A}$
t_f	Fall Time		200		nS	$V_{GE} = 15 \text{ V}, R_g = 3.3$
E_{off}	Turn-Off Losses		1.5		mWs	$L = 1 \text{ mH}, T_J = 125^\circ C$
DIODE CHARACTERISTICS						
V_f	Maximum Forward Voltage			1.85	V	$I_F = 30 \text{ A}, T_C = 25^\circ C$
				1.70	V	$I_F = 30 \text{ A}, T_C = 150^\circ C$
I_r	Maximum Reverse Current			500	μA	$V_R = 1000 \text{ V}, T_C = 25^\circ C$
				7.0	mA	$V_R = 800 \text{ V}, T_C = 125^\circ C$
t_{rr}	Reverse Recovery Time			50	nS	$I_F = 1 \text{ A}, d_f / d_i = -15 \text{ A } \mu S$ $V_R = 30 \text{ V}, T_J = 25^\circ C$

Note 1: Limited by diode I_r characteristic.**MECHANICAL OUTLINE**

OM9034SF OM9035SF

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

IGBT

Parameters		OM9034SF	OM9035SF	Units
V _{CES}		500	1000	V
V _{CER}	(R _{ge} = 20 K)	500	1000	V
I _C @ T _C = 25°C	Continuous Drain Current	60	35	A
I _C @ T _C = 90°C	Continuous Drain Current	30	25	A
I _C Pulsed	Pulsed Drain Current ¹	240	200	A
Junction To Case	Linear Derating Factor	1.0	1.75	W/°C
Junction To Ambient	Linear Derating Factor	.03	.03	W/°C
R _{thJC}	Junction-To-Case	1.0	.60	°C/W
R _{thJA}	Junction-To-Ambient	30	30	°C/W

Rectifier

PIV		600	1000	V
I _O		30	30	A
t _{rr}		35	50	nsec

Gate Driver

V _{DD}	Either Chip	16.5	16.5	V
V _{LSD} to V _{HSD}		600	600	V
LSD to HSD	Slew Rate	10	10	V/μs
Logic Input Voltage		-0.3 to 5.5	-0.3 to 5.5	V
T _j		150	150	°C

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TYPICAL APPLICATION

