650V, 600A Half Bridge IGBT Module



ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNIT
Collector to Emitter Voltage	Vces		650	V
Gate to Emitter Voltage	Vges	-20	20	V
IGBT continuous current at Tc=25C	Icigbt25		800	А
IGBT continuous current at Tc=75C	Icigbt75		600	А
IGBT pulse current at Tc=25C	lpulseigbt25		2400	А
Short Circuit duration, Vce=360V, Tj=150C, Vge=15V	tsc		10	μs
Junction Temperature	Tj	-55	175	°C
Diode continuous current at Tc=25C	Icdiode25		600	А
Diode pulse current at Tc=25C	lpulsediode25		1200	А



ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	MIN	TYP	MAX	UNIT
IGBT					
BVces	Breakdown voltage, Ic = 1mA, Vge=0V	650			V
Vgeth	Threshold voltage, Ic=1mA, Vce=Vge	4.0		6.5	V
Ices	Vce=650V, Vge=0V			100	μA
Ices150	Vce=650V, Vge=0V, Tj=150C			5	mA
Iges	Gate leakage current, Vce=0V, Vge=20V			1	μΑ
Cies	Vce=25V, Vge=0V, f=1MHz		24.6		nF
Coes	Vce=25V, Vge=0V, f=1MHz		1.5		nF
Cres	Vce=25V, Vge=0V, f=1MHz		0.9		nF
Qgon	Ic=480A, Vge=15V, Vce=325V		1300		nC
Qge	Ic=480A, Vge=15V, Vce=325V		240		nC
Qgc	Ic=480A, Vge=15V, Vce=325V		580		nC
tdon	Inductive load, Ic=240A, Vge=15V, Vce=400V		52		ns
trise	Inductive load, Ic=240A, Vge=15V, Vce=400V		64		ns
tdoff	Inductive load, Ic=240A, Vge=15V, Vce=400V		220		ns
tfall	Inductive load, Ic=240A, Vge=15V, Vce=400V		90		ns
Rth	Thermal resistance, junction to case			0.6	∘C/W
Anti-parallel	Diode				,
Vf25	Forward voltage, Tj=25C		1.55	1.95	V
Vf125	Forward voltage, Tj=125C		1.50		V
Irm25	Peak reverse recovery current, If=600A, di/dt=6000A/us, Vr=300V, Vge=-15V, Tj=25C		205		А
Irm125	Peak reverse recovery current, If=600A, di/dt=6000A/us, Vr=300V, Vge=-15V, Tj=125C		300		А
Qr25	Recovered charge, If=600A, di/dt=6000A/us, Vr=300V, Vge=-15V, Tj=25C		17		μC
Qr125	Recovered charge, If=600A, di/dt=6000A/us, Vr=300V, Vge=-15V, Tj=125C		36		μC
Rth	Thermal resistance, junction to case			1.1	∘C/W



NTC Thermistor Characteristics (Heraeus Nexensos M Sensor)

R ₀	Resistance @ T _C = 0 °C		1		K Ohm
R _{TOL}	Resistance Tolerance			±0.12	%
	Measuring Current	0.1		0.3	mA
TCR	$TCR = \frac{R_{100} - R_0}{R_0 * 100^{\circ}C}$ R_{100} is resistance at 100°C, R_0 is resistance at 0°C		3850		ppm/K
	Temperature Range	-70		500	°C
Resistance vs Temperature	$t >= 0$ ° $R(t) = R_0 * (1 + A * t + B * t^2 t < 0$ °C $R(t) = R_0 * (1 + A * t + B * t^2 + C * (t - 100$ °C) * t^3);	$A = 3.9083 * 10^{-3}$ °C ⁻¹ $B = -5.775 * 10^{-7}$ °C ⁻² $C = -4.183 * 10^{-12}$ °C ⁻⁴			

Fig. 1. Output Characteristics @ T_J = 25°C

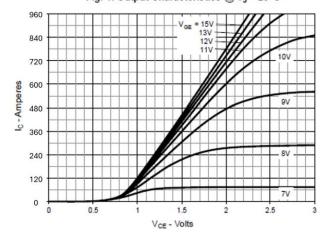
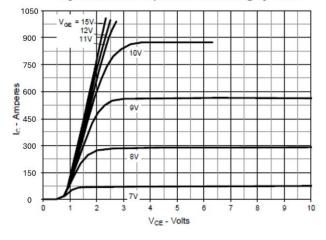
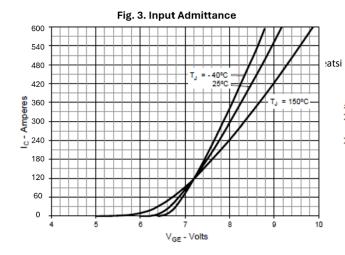


Fig. 2. Extended Output Characteristics @ T_J = 25°C





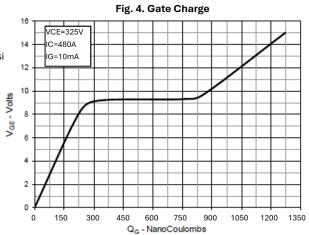
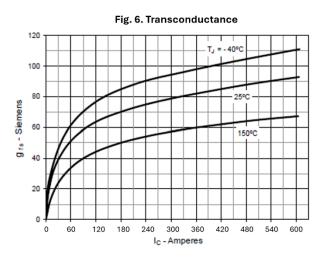
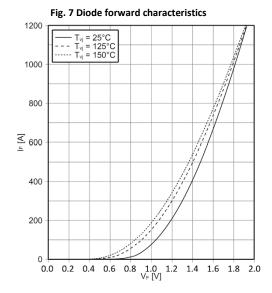
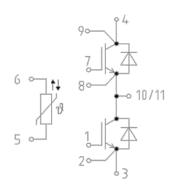


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage T_J = 25°C 4.0 3.5 3.0 V_{CE} - Volts C=960A 2.5 2.0 IC=480A 1.5 1.0 C=240A 0.5 10 11 12 13 V_{GE} - Volts

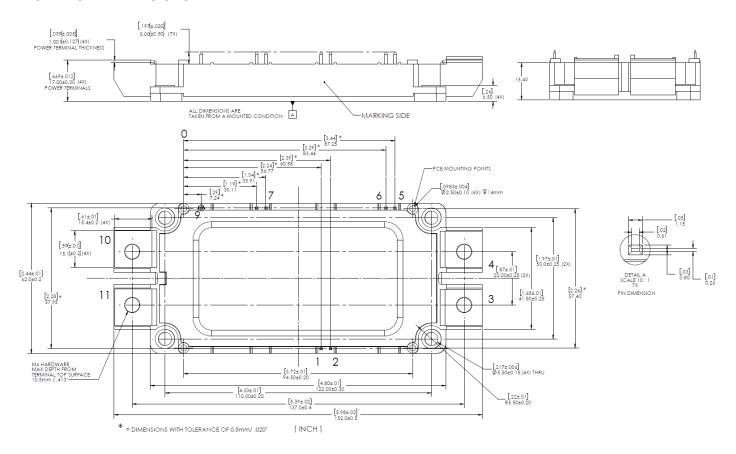








MECHANICAL DIMENSIONS:



Thermal interface material is recommended between base and heatsink.

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