G450HHBK06P2

An Infineon Technologies Company

HALF-BRIDGE IGBT MODULE

600V, 450A

INT-A-Pak 2

Product Summary

Part Number	V_{CE}	I_C	$V_{CE(SAT)}$
GHP500HHBK06P2	600V	450A	1.8V

Description

The IR HiRel INT-A-Pak Series are isolated near hermetic power modules which combine the latest IGBT and Soft Recovery Rectifier Technology. The module uses both high-speed and low $V_{CE(SAT)}$ IGBT's of ultra low thermal resistance junction to case. The G450HHBK06P2 power module consists of six IGBTs and six FREDs in a Phase-Leg or Half-Bridge configuration.

Features

- Rugged, Lightweight near Hermetic Package with Integrated Power Terminal Cap
- Gen 4 IGBT Technology
- Soft Recovery Rectifiers
- AISiC Baseplate and AIN Substrate
- Ultra Low Thermal Resistance
- Zener Gate Protection
- Very Low Conduction and Switching Loss
- -55°C to +125°C Operating Temperature
- Screening to meet the intent of MIL-PRF-38534 Class H
- Short Circuit Capability
- 2 Ohms Series Gate Resistance
- High Altitude Operation, 85,000 Feet above Sea Level at Rated Voltage

Absolute Maximum Ratings @ T_J = 25°C (unless otherwise specified)

Parameter	Symbol	Value	Units
Collector-to-Emitter Voltage	V_{CES}	600	V
Gate-to-Emitter Voltage	V_{GE}	±20	
Continuous Collector Current @ T_C = 25°C	I_C	600	A
Continuous Collector Current @ T_C = 70°C		450	
Isolation Voltage	V_{ISOL}	2500	V_{RMS}

Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
Collector Emitter Breakdown Voltage	V_{CES}	V_{GE} = 0V	600	—	—	V
Zero Gate Voltage Collector Current	I_{CES}	V_{GE} = 0V, V_{CE} = 600V	—	—	2.0	mA
Gate Emitter Leakage Current	I_{GES}	V_{GE} = ±15V, V_{CE} = 0V	—	—	10	µA
On Characteristics						
Gate Threshold Voltage	$V_{GE(TH)}$	V_{CE} = V_{GE}, I_C = 45mA	4.0	—	7.5	V
Collector Emitter Saturation Voltage	$V_{CE(SAT)}$	V_{GE} = 15V, I_C = 450A	—	1.8	2.6	
Dynamic Characteristics						
Total Gate Charge	Q_G	V_{CE} = 300V, I_C = 450A, V_{GE} = 15V	—	2600	—	nC
Input Capacitance	C_{IES}	V_{GE} = 0V, V_{CE} = 25V, f = 1.0MHz	—	48	—	nF
Output Capacitance	C_{OES}		—	3.0	—	
Reverse Transfer Capacitance	C_{RES}		—	0.3	—	
Switching Inductive Load Characteristics						
Turn-On Delay Time	$t_{d(on)}$	V_{CC} = 300V, I_C = 450A, V_{GE} = +15V $R_{G(on)}$ = 5Ω, $R_{G(off)}$ = 10Ω, L = 200µH	—	500	900	ns
Rise Time	tr		—	280	700	
Turn-On Losses	E_{on}		—	20	—	mJ
Turn-Off Delay Time	$t_{d(off)}$		—	2600	3400	ns
Fall Time	tf		—	500	650	
Turn-Off Losses	E_{off}		—	60	—	mJ
Diode Characteristics						
Forward Voltage	V_F	I_F = 450A	—	1.2	1.8	V
Reverse Recovery Charge	Q_{rr}	V_R = 300V, I_F =450A, di/dt =-1800A/µs	—	15	36	µC
Peak Reverse Recovery Current	I_{rr}		—	160	—	A
Reveres Recovery Time	t_{rr}		—	180	260	ns

For Notes, refer to the page 5

Electrical Characteristics @ T_J = 125°C (unless otherwise specified)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
Collector Emitter Breakdown Voltage	V_{CES}	V_{GE} = 0V	600	—	—	V
Zero Gate Voltage Collector Current	I_{CES}	V_{GE} = 0V, V_{CE} = 600V	—	—	18	mA
Gate Emitter Leakage Current	I_{GES}	V_{GE} = ±15V, V_{CE} = 0V	—	—	10	µA
On Characteristics						
Gate Threshold Voltage	$V_{GE(TH)}$	V_{CE} = V_{GE}, I_C = 45mA	4.0	—	7.5	V
Collector Emitter Saturation Voltage	$V_{CE(SAT)}$	V_{GE} = 15V, I_C = 450A	—	1.8	2.6	
Diode Characteristics						
Forward Voltage	V_F	I_F = 450A	—	1.2	1.8	V

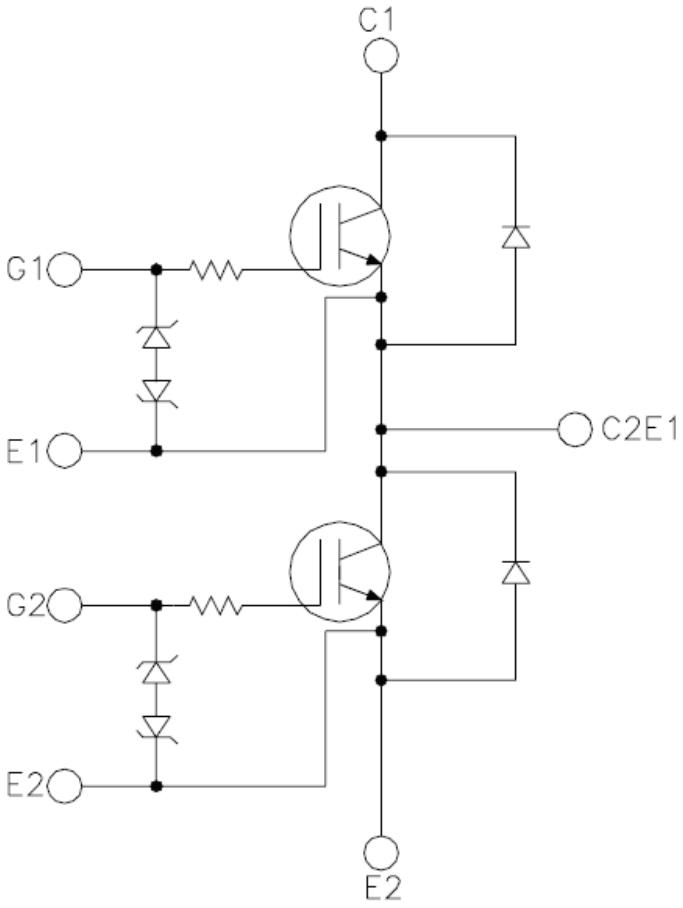
Thermal-Mechanical Specifications

Parameter	Symbol	Min.	Typ.	Max.	Units
IGBT Thermal Resistance, Junction-to-Case, per Switch	R_{thJC}	—	0.05	0.07	°C/W
Diode Thermal Resistance, Junction-to-Case, per Switch		—	0.10	0.13	
Operating Junction Temperature Range	T_J	-55	—	150	°C
Storage Temperature Range	T_{STG}	-55	—	125	
Screw Torque - Mounting	T	—	—	26	in-lbs
Screw Torque - Terminals					
Module Weight		—	—	270	g

Module Screening

Test or Inspection	MIL-PRF-883		Comments
	Method	Condition	
Internal Visual	2017		
Temperature Cycle	1010	B	10 Cycles, -55°C to +125°C
Mechanical Shock	2002	B	1500G, 0.5ms, 5 Times (Y1 direction only)
Burn-in	1015	A	160 Hrs @ +125°C
Final Electrical Test			Group A, -55°C, +25°C, +125°C
External Visual	2009		

Schematic



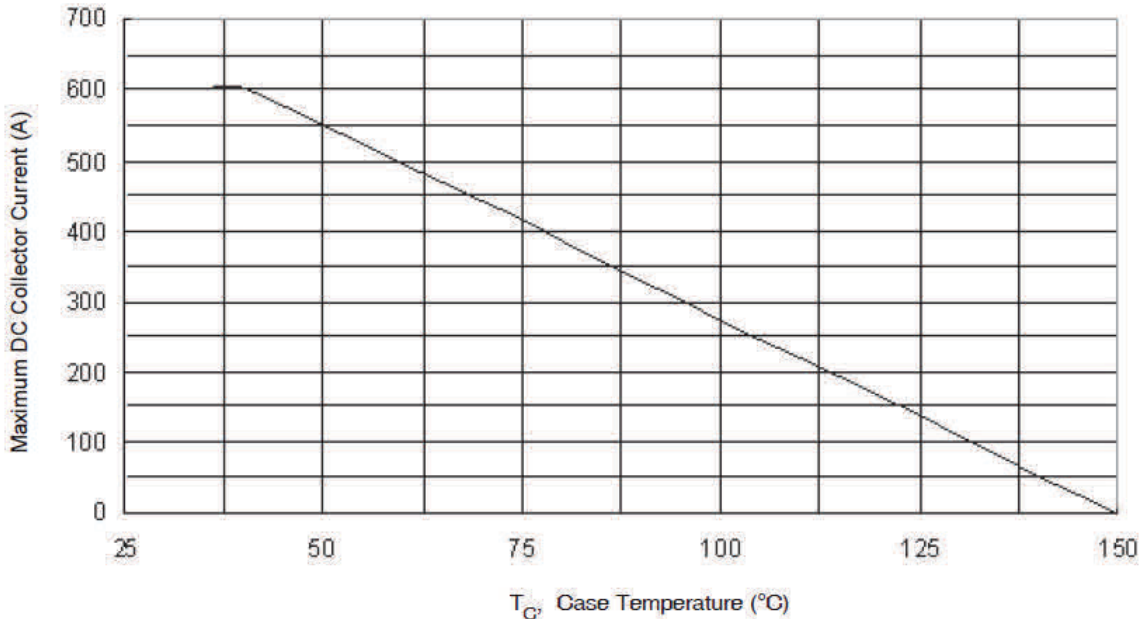


Fig 1. Maximum Collector Current Vs Case Temperature

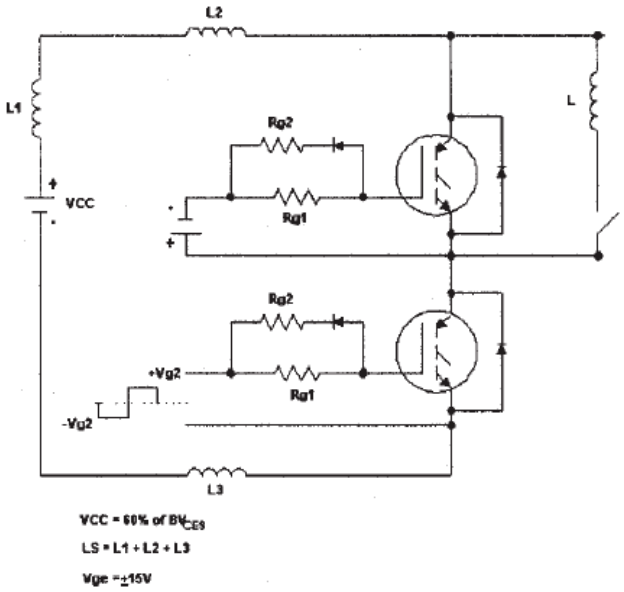


Fig 2. Test Circuit for Measurement of
Eon, Eoff, trr, Qrr, Irr, td(on), tr, td(off), tf

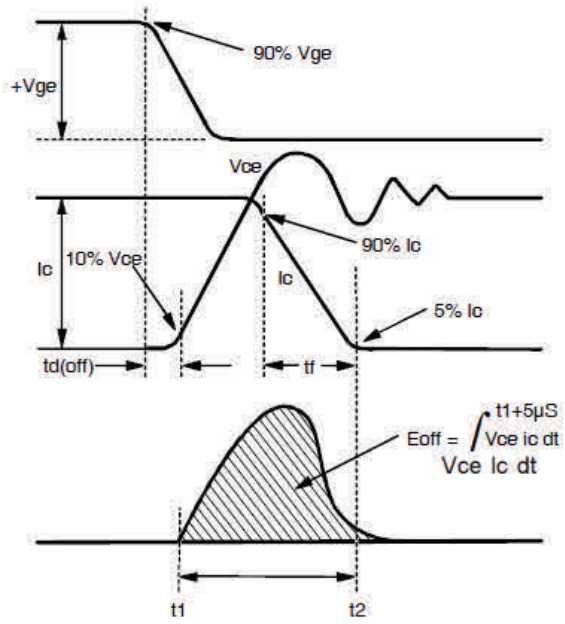


Fig 3. Test Waveforms for Circuit of **Fig 2**
Defining Eoff, td(off), tf

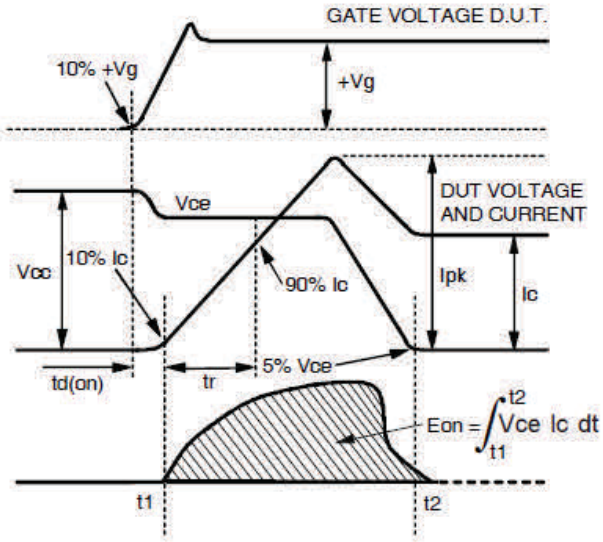


Fig 4. Test Waveforms for Circuit of **Fig 2**
Defining Eon, td(on), tr

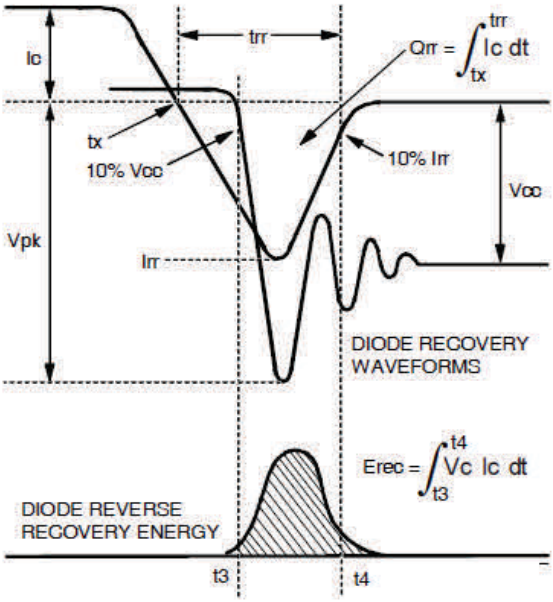
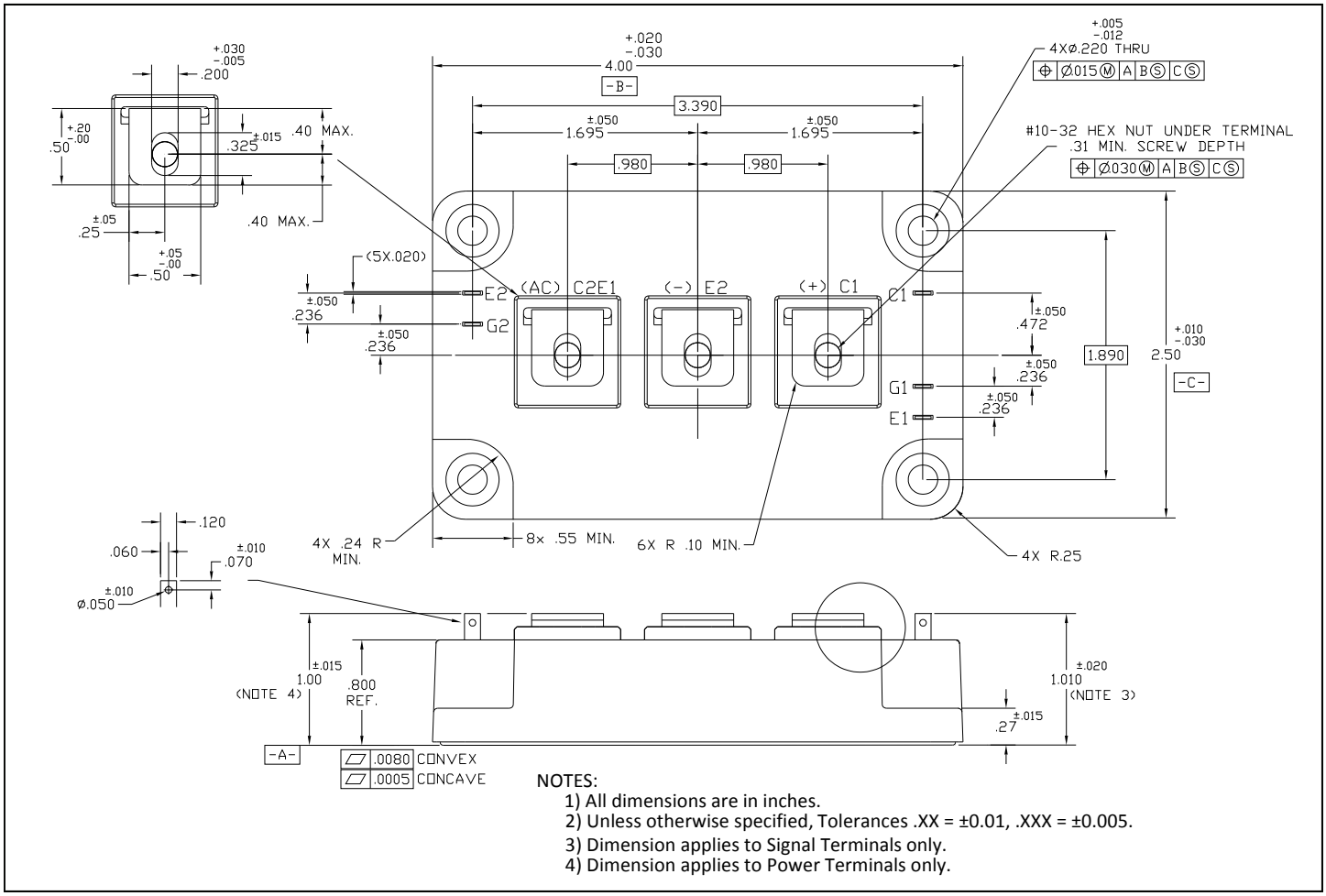


Fig 5. Test Waveforms for Circuit of **Fig 2**
Defining Erec, trr, Qrr, Irr

Case Outline and Dimensions - INT-A-Pak 2



NOTES:
1) All dimensions are in inches.
2) Unless otherwise specified, Tolerances .XX = ±0.01, .XXX = ±0.005.
3) Dimension applies to Signal Terminals only.
4) Dimension applies to Power Terminals only.

Part Numbering Nomenclature

G 450 HH B K 06 P2 H

IGBT Module

Current Capability
450 = 450 Amps

Circuit Configuration
HH = Half Bridge

Generation
IGBT / FWD Configuration
B = GEN 4 / GEN 3

Screening Level
P = Unscreened, 25°C Electrical Test
(Not intended for Qualification)
H = Screened per MIL-PRF-38534

Package Type
P2 = INT-A-Pak 2,
2.5" X 4.0" X 1.0"

Voltage
06 = 600V

IGBT Speed / SC Capability
K = Fast, SC Capable

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