

IGBT

GD50HFK120C1S

Preliminary

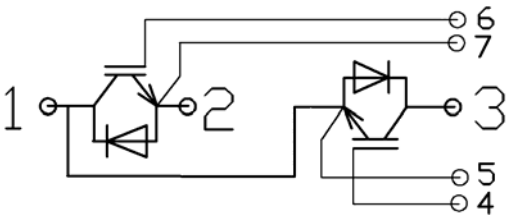
Molding Type Module

1200V/50A 2 in one-package



Features

- 10μs short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Square RBSOA
- Latch-up free
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- Isolated copper baseplate using DBC technology



Equivalent Circuit Schematic

Typical Applications

- Switching mode power supplies
- UPS
- Electrical welder

Absolute Maximum Ratings $T_C=25^{\circ}C$ unless otherwise noted

Symbol	Description	GD50HFK120C1S	Units
V_{CES}	Collector-Emitter Voltage	1200	V

Symbol	Description	GD50HFK120C1S	Units
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current @ $T_C=25^\circ\text{C}$ @ $T_C=80^\circ\text{C}$	100	A
		50	
$I_{CM(1)}$	Pulsed Collector Current $t_p=1\text{ms}$	100	A
I_F	Diode Continuous Forward Current	50	A
I_{FM}	Diode Maximum Forward Current	100	A
P_D	Maximum Power Dissipation @ $T_J=150^\circ\text{C}$	463	W
T_{SC}	Short Circuit Withstand Time @ $T_J=125^\circ\text{C}$	10	μs
T_J	Maximum Junction Temperature	150	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-40 to +125	$^\circ\text{C}$
$I^2t\text{-value, Diode}$	$V_R=0\text{V}, t=10\text{ms}, T_J=125^\circ\text{C}$	450	A^2s
V_{ISO}	Isolation Voltage RMS, $f=50\text{Hz}, t=1\text{min}$	2500	V
Mounting Torque	Power Terminal Screw:M5	2.5 to 5.0	N.m
	Mounting Screw:M6	3.0 to 5.0	N.m

Notes:

(1) Repetitive rating: Pulse width limited by max. junction temperature

Electrical Characteristics of IGBT $T_C=25^\circ\text{C}$ unless otherwise noted

Off Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	$T_J=25^\circ\text{C}$	1200			V
I_{CES}	Collector Cut-Off Current	$V_{CE}=V_{CES}, V_{GE}=0\text{V},$ $T_J=25^\circ\text{C}$			2.0	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=V_{GES}, V_{CE}=0\text{V},$ $T_J=25^\circ\text{C}$			400	nA

On Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=500\mu\text{A}, V_{CE}=V_{GE},$ $T_J=25^\circ\text{C}$	4.4		6.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=50\text{A}, V_{GE}=15\text{V},$ $T_J=25^\circ\text{C}$		2.15	2.55	V
		$I_C=50\text{A}, V_{GE}=15\text{V},$ $T_J=125^\circ\text{C}$		2.65		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600\text{V}, I_C=50\text{A},$ $R_G=22\Omega, V_{GE}=\pm 15\text{V},$ $T_J=25^\circ\text{C}$		381		ns
t_r	Rise Time			163		ns
$t_{d(off)}$	Turn-Off Delay Time			393		ns

GD50HFK120C1S**IGBT Module**

t_f	Fall Time	$V_{CC}=600V, I_C=50A,$		76		ns
E_{on}	Turn-On Switching Loss	$R_G=22\Omega, V_{GE}=\pm 15V,$		5.70		mJ
E_{off}	Turn-Off Switching Loss	$T_J=25^\circ C$		3.45		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=50A,$ $R_G=22\Omega, V_{GE}=\pm 15V,$ $T_J=125^\circ C$		395		ns
t_r	Rise Time			76		ns
$t_{d(off)}$	Turn-Off Delay Time			399		ns
t_f	Fall Time			265		ns
E_{on}	Turn-On Switching Loss			6.82		mJ
E_{off}	Turn-Off Switching Loss			4.86		mJ
C_{ies}	Input Capacitance	$V_{CE}=30V, f=1MHz,$ $V_{GE}=0V$		4.30		nF
C_{oes}	Output Capacitance			0.40		nF
C_{res}	Reverse Transfer Capacitance			0.16		nF
I_{SC}	SC Data	$t_{SC}\leq 10\mu s, V_{GE}=15V,$ $T_J=125^\circ C, V_{CC}=900V,$ $V_{CEM}\leq 1200V$		TBD		A
L_{CE}	Stray Inductance				30	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip	$T_C=25^\circ C$		0.75		m Ω

Electrical Characteristics of DIODE $T_C=25^\circ C$ unless otherwise noted

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V _F	Diode Forward Voltage	I _F =50A	T _j =25°C		1.82	2.25	V
			T _j =125°C		1.95		
Q _r	Diode Reverse Recovery Charge	I _F =50A, V _R =600V, di/dt=-762A/μs, V _{GE} =-15V	T _j =25°C		3.4		μC
			T _j =125°C		6.4		
I _{RM}	Diode Peak Reverse Recovery Current		T _j =25°C		35		A
			T _j =125°C		44		
E _{rec}	Reverse Recovery Energy		T _j =25°C		1.07		mJ
			T _j =125°C		2.26		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (IGBT Part, per 1/2 Module)		0.27	K/W
$R_{\theta JC}$	Junction-to-Case (DIODE Part, per 1/2 Module)		0.49	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.05		K/W
Weight	Weight of Module	150		g

Package Dimension

Dimensions in Millimeters

