

STARPOWER

SEMICONDUCTOR™

IGBT

GD100HFK60C1S

Molding Type Module

600V/100A 2 in one-package

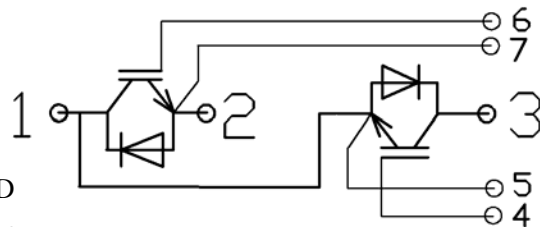
General Description

STARPOWER IGBT Power Module provides ultra low conduction loss as well as short circuit ruggedness. They are designed for the applications such as general UPS and SMPS.



Features

- High short circuit capability, self limiting to $6 \cdot I_C$
- 10 μ s short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Latch-up free
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- Isolated copper baseplate using DCB technology



Equivalent Circuit Schematic

Typical Applications

- UPS
- Switching mode power supplies
- Electronic welders at f_{sw} up to 25kHz

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

Symbol	Description	GD100HFK60C1S	Units
V_{CES}	Collector-Emitter Voltage	600	V

Symbol	Description	GD100HFK60C1S	Units
V_{GES}	Gate-Emitter Voltage	$\pm 20V$	V
I_C	Collector Current @ $T_C=25^\circ C$ @ $T_C=80^\circ C$	130	A
		100	
$I_{CM(1)}$	Pulsed Collector Current @ $T_C=80^\circ C$	200	A
I_F	Diode Continuous Forward Current	100	A
I_{FM}	Diode Maximum Forward Current	200	A
P_D	Maximum power Dissipation @ $T_j=150^\circ C$	450	W
T_{SC}	Short Circuit Withstand Time @ $T_j=125^\circ C$	10	μs
T_J	Operating Junction Temperature	-40 to +150	$^\circ C$
T_{STG}	Storage Temperature Range	-40 to +125	$^\circ C$
I^2t -value, Diode	$V_R=0V, t=10ms, T_j=125^\circ C$	1250	A^2s
V_{ISO}	Isolation Voltage RMS, $f=50Hz, t=1min$	2500	V
Mounting Torque	Power Terminal Screw:M5	2.5 to 5.0	N.m
	Mounting Screw:M6	3.0 to 6.0	N.m

Notes:

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

Electrical Characteristics of IGBT $T_C=25^\circ C$ unless otherwise noted**Off Characteristics**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{CES}	Collector-Emitter Breakdown Voltage	$T_j=25^\circ C$	600			V
I_{CES}	Collector Cut-Off Current	$V_{CE}=V_{CES}, V_{GE}=0V,$ $T_j=25^\circ C$			5.0	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=V_{GES}, V_{CE}=0V,$ $T_j=25^\circ C$			400	nA

On Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=1.5mA, V_{CE}=V_{GE},$ $T_j=25^\circ C$	3.5	4.5	5.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=100A, V_{GE}=15V, T_j=25^\circ C$		1.9		V
		$I_C=100A, V_{GE}=15V,$ $T_j=125^\circ C$		2.3		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=300V, I_C=100A,$ $R_G=2.2\Omega, V_{GE} = \pm 15V,$ $T_j=25^\circ C$		28		ns
t_r	Rise Time			12		ns
$t_{d(off)}$	Turn-Off Delay Time			130		ns

t_f	Fall Time	$V_{CC}=300V, I_C=100A,$ $R_G=2.2\Omega, V_{GE} = \pm 15V,$ $T_j=25^\circ C$	20		ns
E_{on}	Turn-On Switching Loss		0.8		mJ
E_{off}	Turn-Off Switching Loss		2.4		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=300V, I_C=100A,$ $R_G=2.2\Omega, V_{GE} = \pm 15V,$ $T_j=125^\circ C$	50		ns
t_r	Rise Time		15		ns
$t_{d(off)}$	Turn-Off Delay Time		150		ns
t_f	Fall Time		30		ns
E_{on}	Turn-On Switching Loss		1.0		mJ
E_{off}	Turn-Off Switching Loss		2.9		mJ
C_{ies}	Input Capacitance	$V_{CE} = 25V, f=1MHz,$ $V_{GE} = 0V$	12.8		nF
C_{oes}	Output Capacitance		0.82		nF
C_{res}	Reverse Transfer Capacitance		0.18		nF
I_{SC}	SC Data	$T_P \leq 10\mu s, V_{GE}=15V,$ $T_j=125^\circ C, V_{CC}=300V,$ $V_{CEM} \leq 600V$	450		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_{FM}	Diode Forward Voltage	$I_F=100A$	$T_j=25^\circ C$	1.4	1.6	V
			$T_j=125^\circ C$	1.6	1.8	
Q_{rr}	Diode Reverse Recovery Charge	$I_F=100A,$ $V_R=300V,$ $di/dt=-4400A/us,$ $V_{GE}=-15V$	$T_j=25^\circ C$	8		μC
			$T_j=125^\circ C$	14		
I_{rr}	Diode Peak Reverse Recovery Current		$T_j=25^\circ C$	150		A
			$T_j=125^\circ C$	170		
E_{rec}	Reverse Recovery Energy		$T_j=25^\circ C$	2.2		mJ
			$T_j=125^\circ C$	3.2		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (IGBT Part, per 1/2 Module)		0.17	$^\circ C/W$
$R_{\theta JC}$	Junction-to-Case (DIODE Part, per 1/2 Module)		0.48	$^\circ C/W$
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.05		$^\circ C/W$
Weight	Weight of Module	180		g

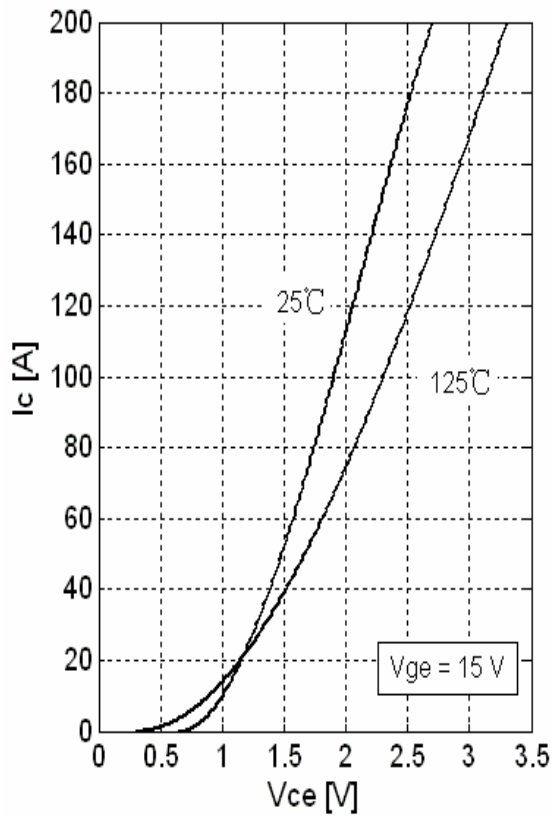


Fig 1. Typical Output Characteristics

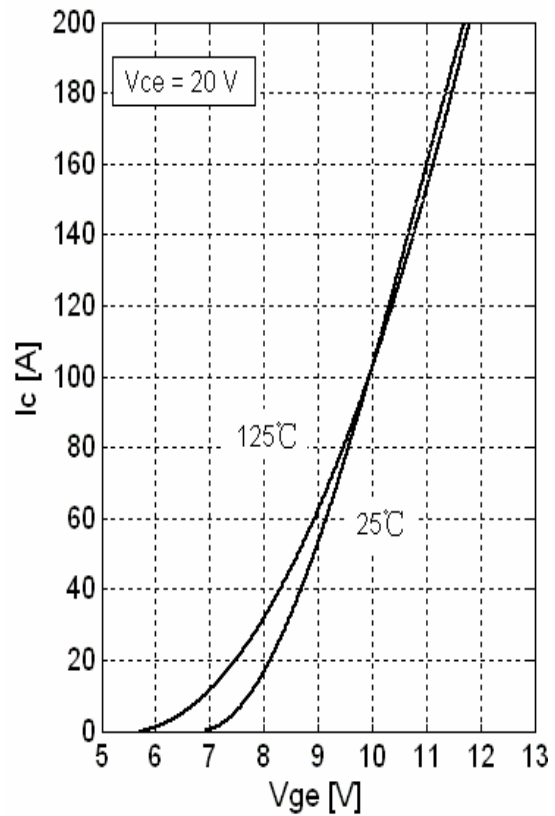


Fig 2. Typical Transfer Characteristics

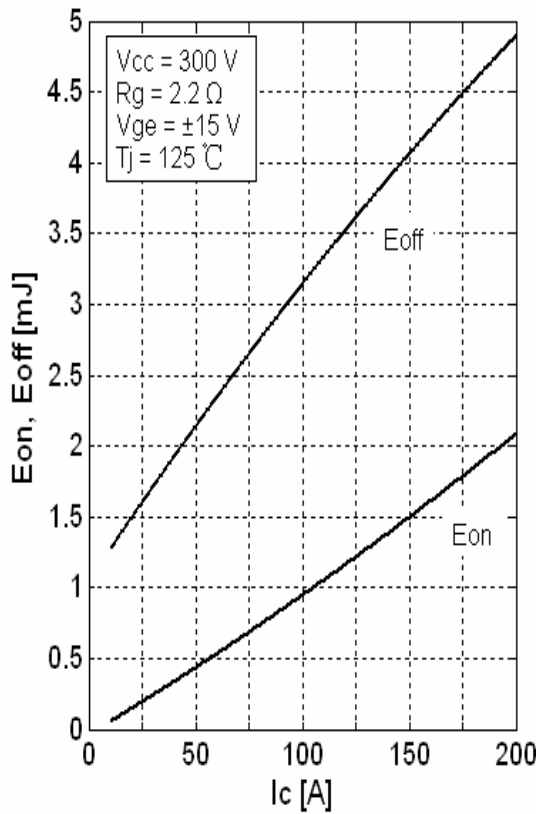


Fig 3. Switching Loss vs Collector Current

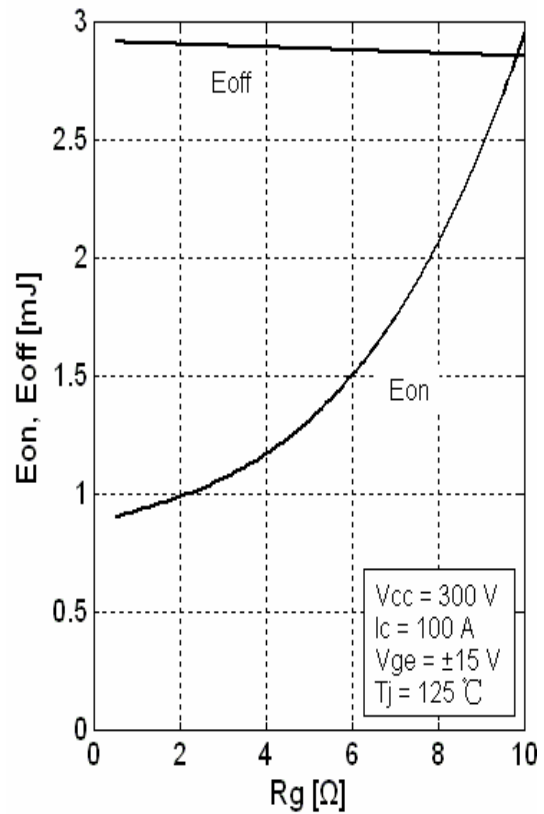


Fig 4. Switching Loss vs Gate Resistor

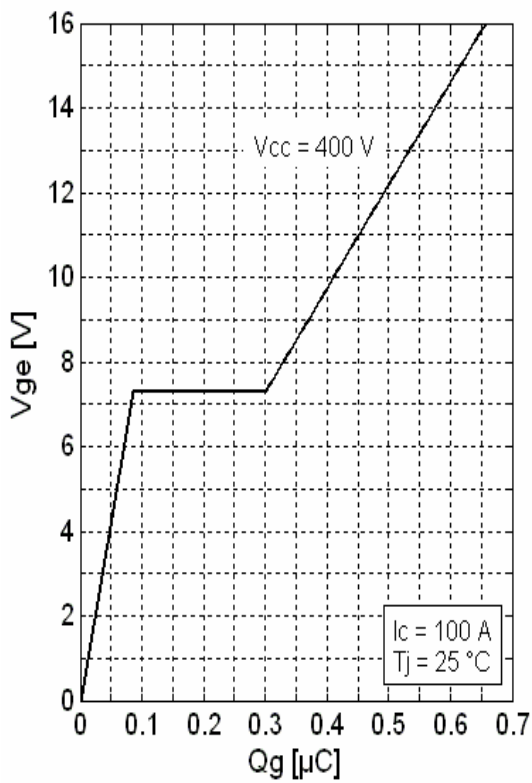


Fig 5. Gate Charge Characteristics.

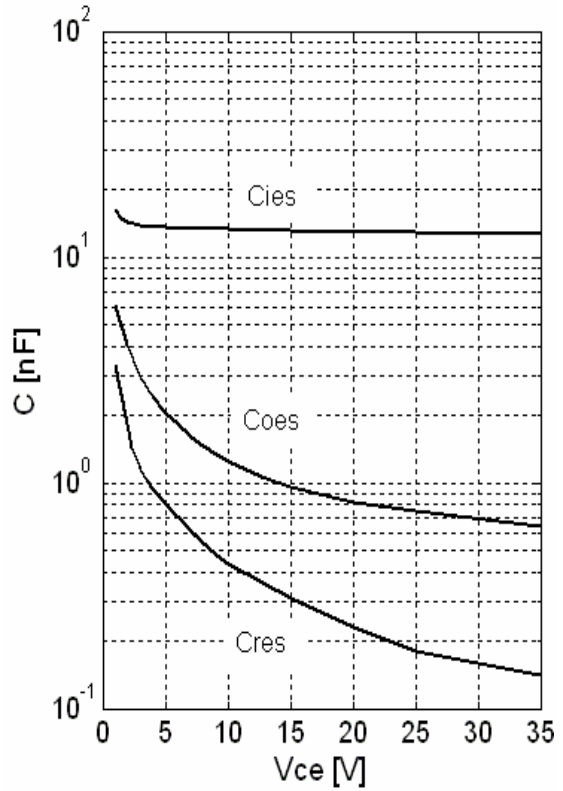


Fig 6. Typical Capacitance vs Collector-Emitter Voltage

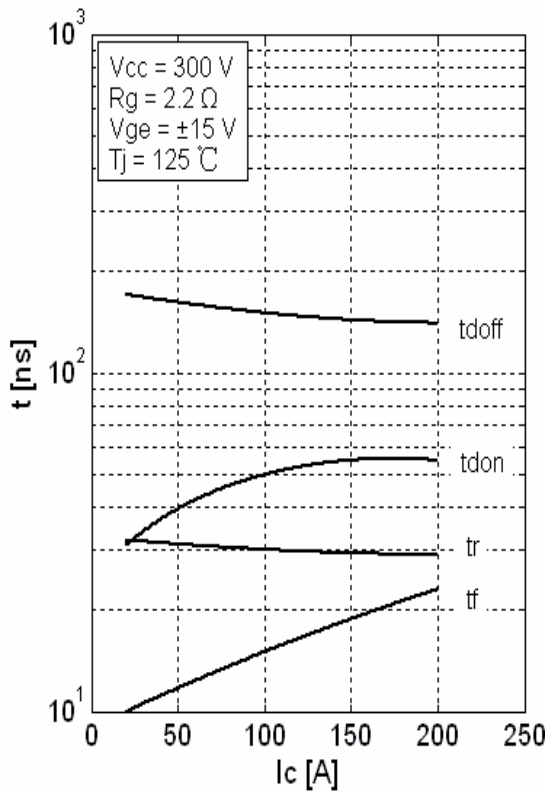


Fig 7. Typical Switching Times vs I_C

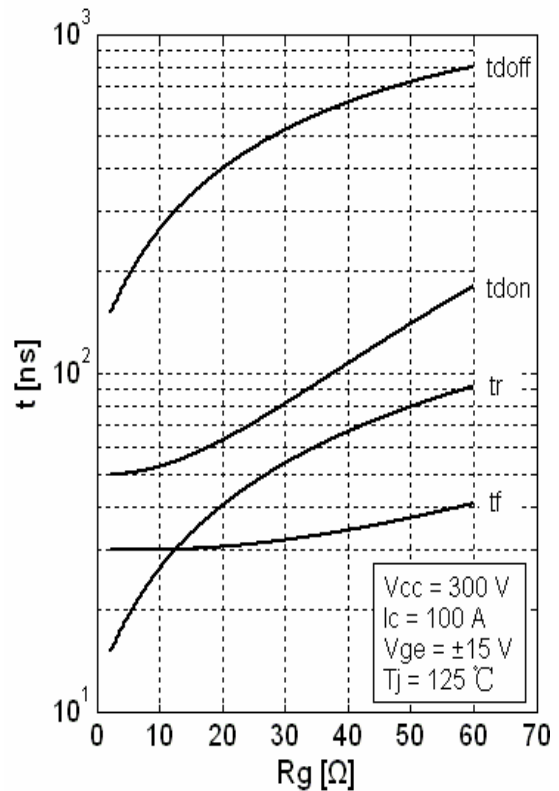


Fig 8. Typical Switching Times vs Gate Resistance R_G

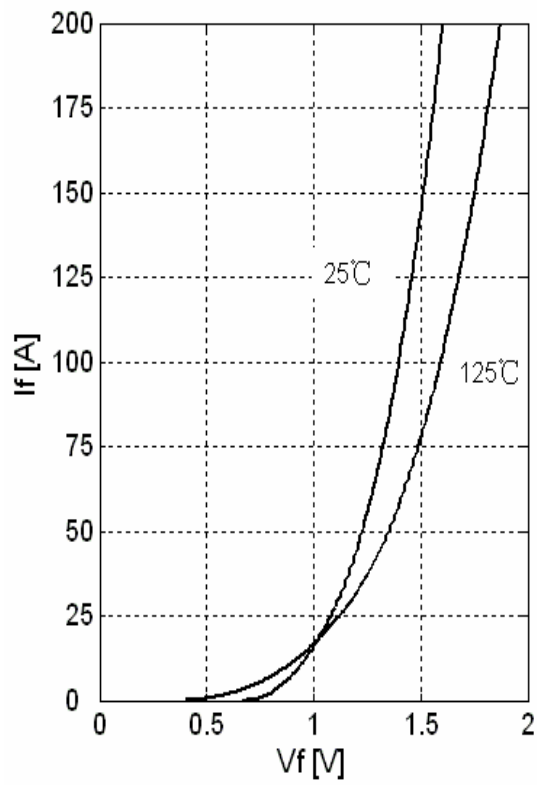


Fig 9. Typical Forward Characteristics (diode)

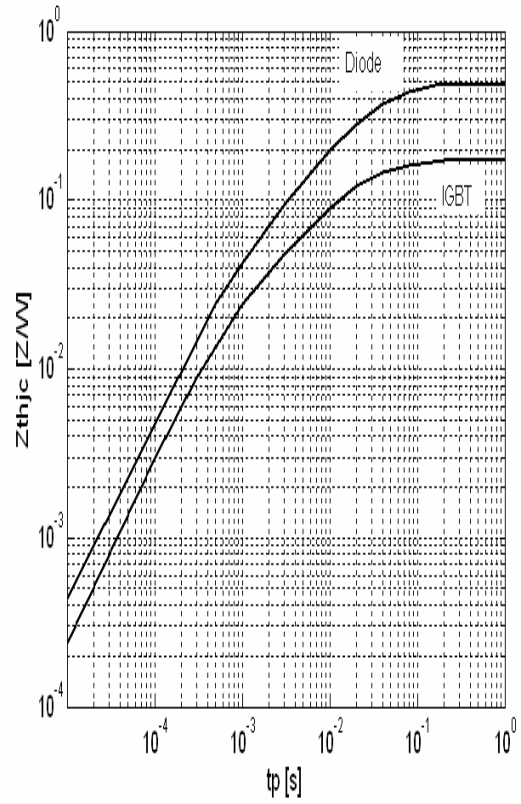
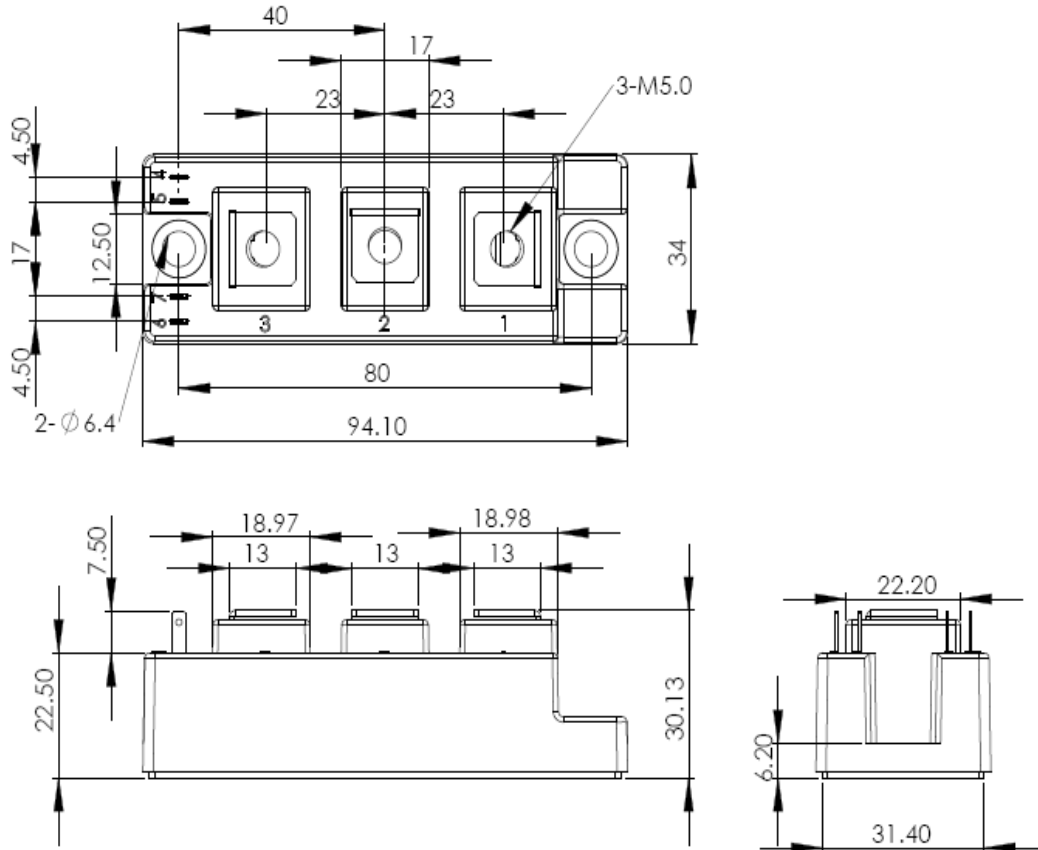


Fig 10. Transient thermal impedance

Package Dimension

Dimensions in Millimeters



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