

IGBT

GD75HFK60C1S

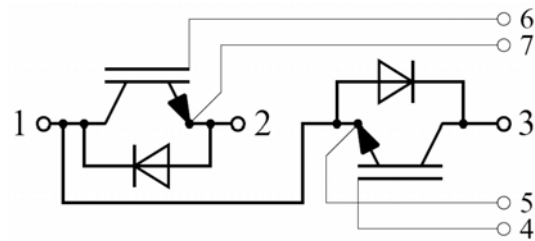
Molding Type Module

600V/75A 2 in one-package



Features

- Low $V_{CE(sat)}$ NPT IGBT technology
- 10 μ s short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Rugged with ultrafast performance
- Square RBSOA
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- Isolated copper baseplate using DBC technology



Equivalent Circuit Schematic

Typical Applications

- Electrical welder
- SMPS
- UPS

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

Symbol	Description	GD75HFK60C1S	Units
V_{CES}	Collector-Emitter Voltage	600	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current @ $T_C=25^{\circ}\text{C}$ @ $T_C=80^{\circ}\text{C}$	110	A
		75	
$I_{CM(1)}$	Pulsed Collector Current $t_p=1\text{ms}$	150	A
I_F	Diode Continuous Forward Current	75	A
I_{FM}	Diode Maximum Forward Current	150	A
P_D	Maximum Power Dissipation @ $T_J=150^{\circ}\text{C}$	297	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	$^{\circ}\text{C}$
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	$T_J=25^{\circ}\text{C}$	600			V
I_{CES}	Collector Cut-Off Current	$V_{CE}=V_{CES}$, $V_{GE}=0\text{V}$, $T_J=25^{\circ}\text{C}$			1.0	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	$I_C=250\mu\text{A}$, $V_{CE}=V_{GE}$, $T_J=25^{\circ}\text{C}$	3.5	4.5	5.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=75\text{A}$, $V_{GE}=15\text{V}$, $T_J=25^{\circ}\text{C}$		1.95	2.40	V
		$I_C=75\text{A}$, $V_{GE}=15\text{V}$, $T_J=125^{\circ}\text{C}$		2.25		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=300V, I_C=75A,$ $R_G=18\Omega, V_{GE}=\pm 15V,$ $T_J=25^\circ C$		217		ns
t_r	Rise Time			72		ns
$t_{d(off)}$	Turn-Off Delay Time			230		ns
t_f	Fall Time			88		ns
E_{on}	Turn-On Switching Loss			1.69		mJ
E_{off}	Turn-Off Switching Loss			1.33		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=300V, I_C=75A,$ $R_G=18\Omega, V_{GE}=\pm 15V,$ $T_J=125^\circ C$		213		ns
t_r	Rise Time			72		ns
$t_{d(off)}$	Turn-Off Delay Time			236		ns
t_f	Fall Time			103		ns
E_{on}	Turn-On Switching Loss			1.79		mJ
E_{off}	Turn-Off Switching Loss			1.80		mJ
C_{ies}	Input Capacitance	$V_{CE}=30V, f=1MHz,$ $V_{GE}=0V$		4.30		nF
C_{oes}	Output Capacitance			0.35		nF
C_{res}	Reverse Transfer Capacitance			0.16		nF
I_{SC}	SC Data	$t_{SC}\leq 10\mu s, V_{GE}=15V,$ $T_J=125^\circ C, V_{CC}=360V,$ $V_{CEM}\leq 600V$		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	$I_F=75A$	$T_J=25^\circ C$	1.50	1.90	V
			$T_J=125^\circ C$	1.55		
Q_r	Recovered Charge	$I_F=75A,$	$T_J=25^\circ C$	3.2		μC
			$T_J=125^\circ C$	4.2		
I_{RM}	Peak Reverse Recovery Current	$V_R=300V,$ $di/dt=-1200A/\mu s,$	$T_J=25^\circ C$	49		A
			$T_J=125^\circ C$	51		
E_{rec}	Reverse Recovery Energy	$V_{GE}=-15V$	$T_J=25^\circ C$	0.76		mJ
			$T_J=125^\circ C$	0.96		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		0.42	K/W
$R_{\theta JC}$	Junction-to-Case (per DIODE)		1.04	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.05		K/W
Weight	Weight of Module	150		g

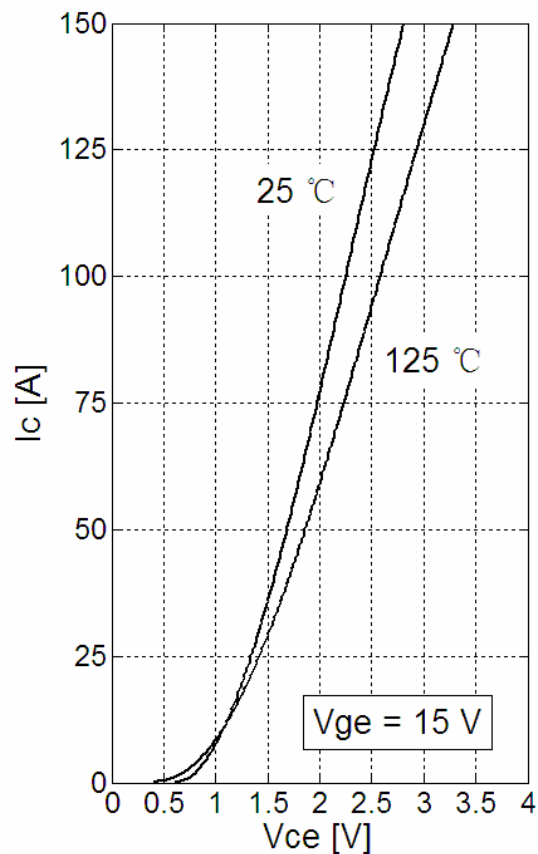


Fig 1. IGBT Typical Output Characteristics

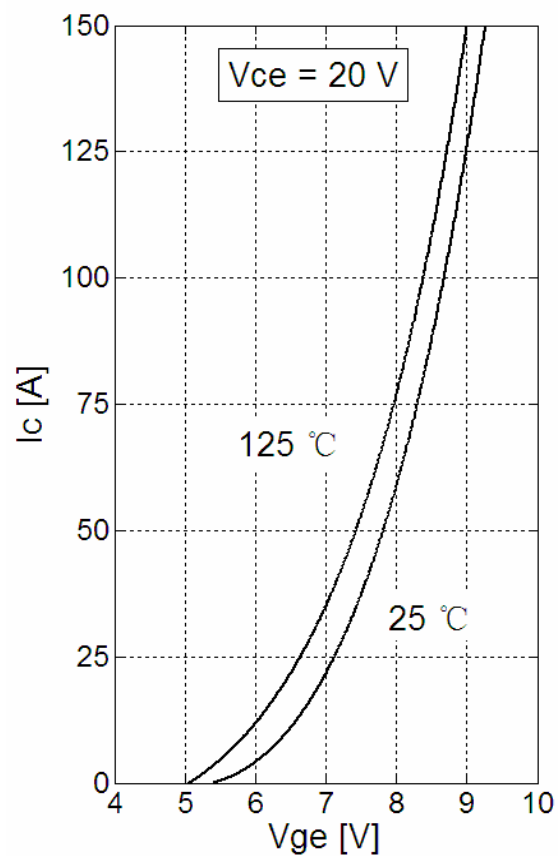
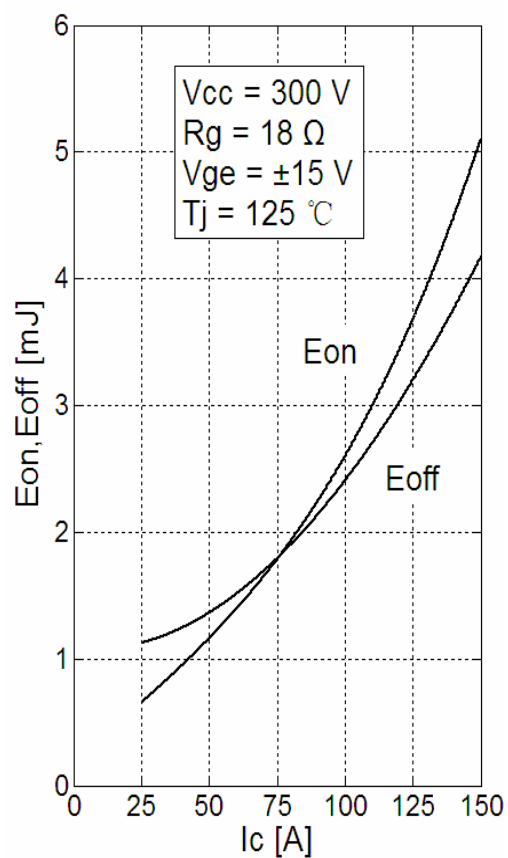
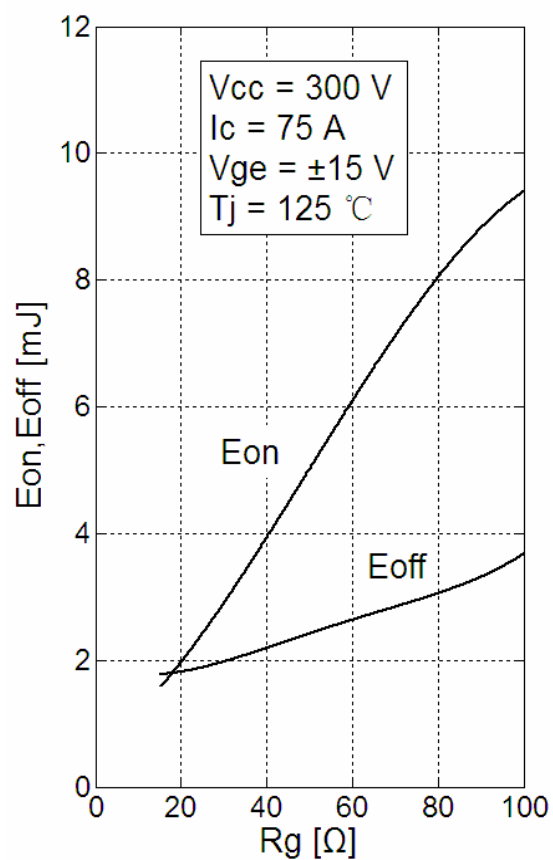


Fig 2. IGBT Typical Transfer Characteristics

Fig 3. IGBT Switching Loss vs. I_c Fig 4. IGBT Switching Loss vs. R_g

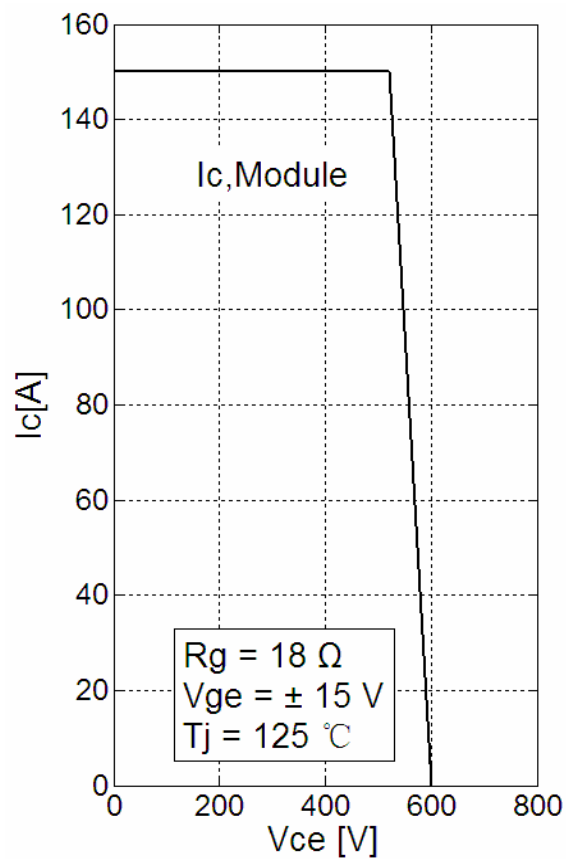


Fig 5. RBSOA

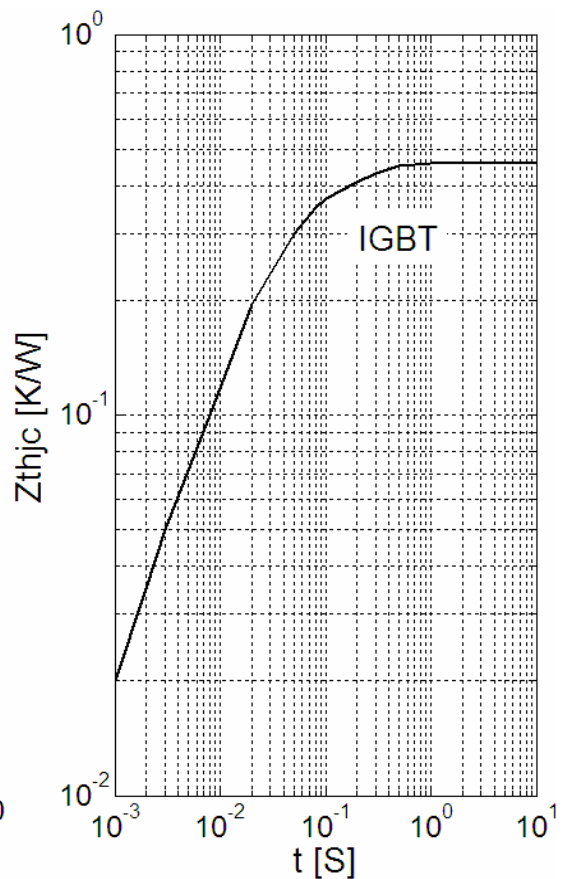


Fig 6. IGBT Transient Thermal Impedance

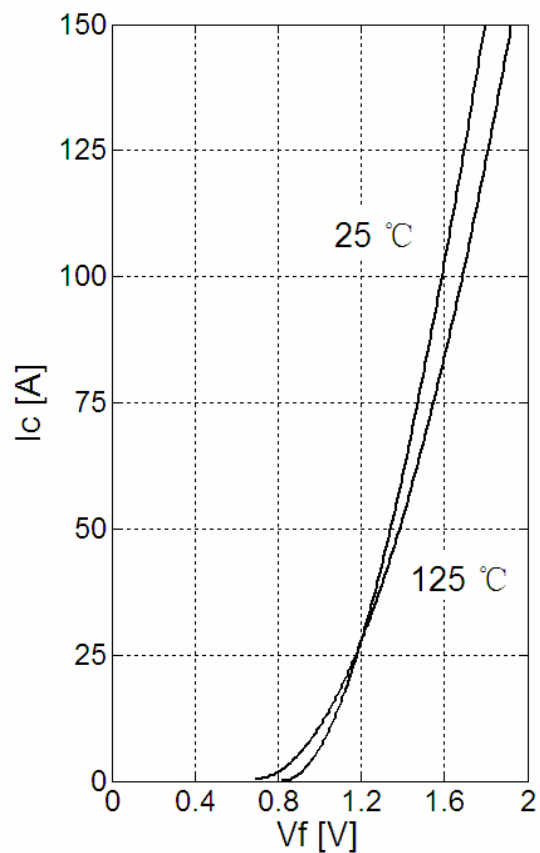
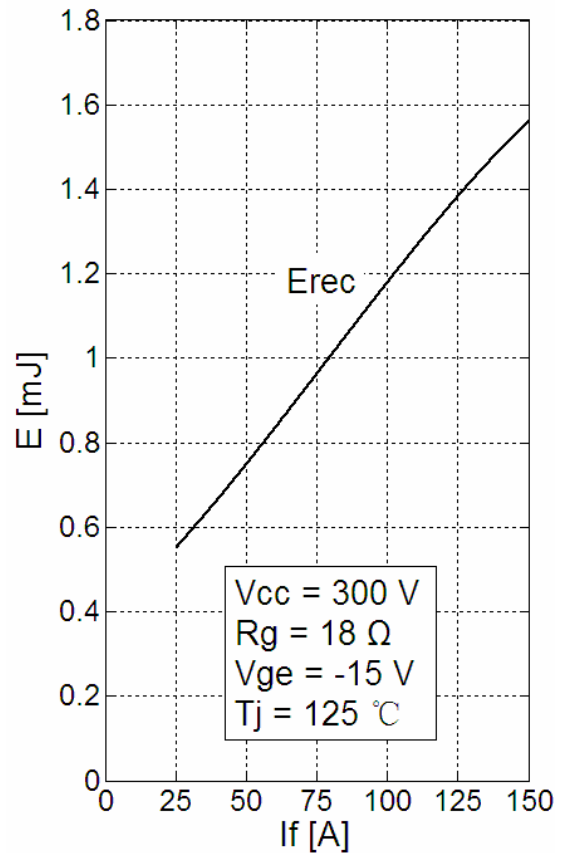


Fig 7. Diode Typical Forward Characteristics

Fig 8. Diode Switching Loss vs. I_f

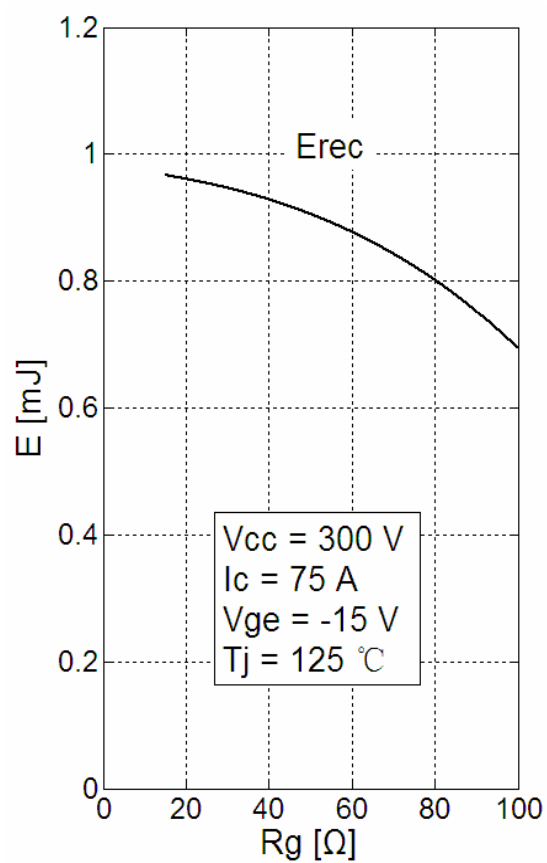
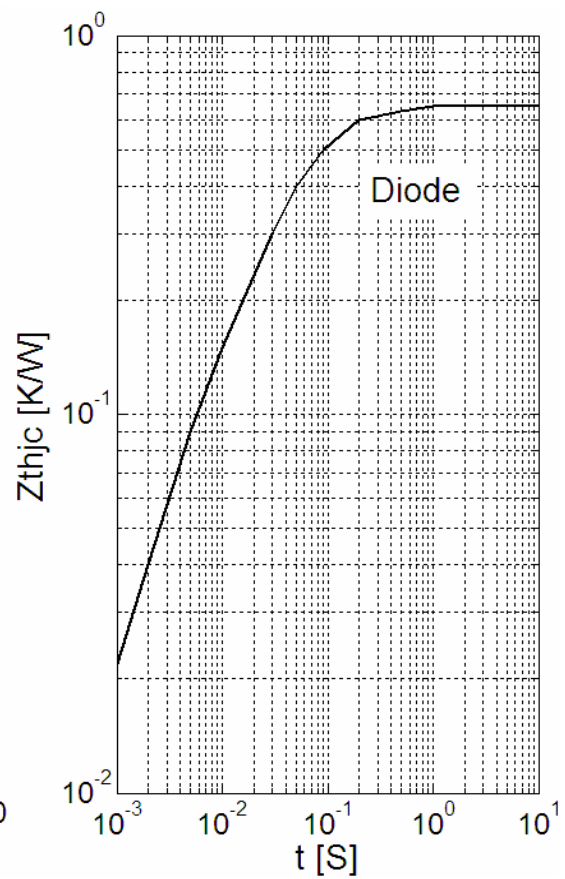
Fig 9. Diode Switching Loss vs. R_g 

Fig 10. Diode Transient Thermal Impedance

Package Dimension

Dimensions in Millimeters

