

STARPOWER

SEMICONDUCTOR™

IGBT

GD300HFU120C2S

Molding Type Module

1200V/300A 2 in one-package

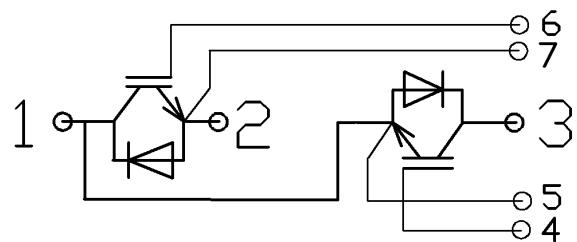
General Description

STARPOWER IGBT Power Module provides ultrafast Switching speed as well as short circuit ruggedness. It's designed for the applications such as electronic welders and Inductive heating.



Features

- High short circuit capability, self limiting to $6 \cdot I_{Cnom}$
- Rugged with ultrafast performance
- Low t_{rr} and I_{rr}
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- 10us short circuit capability
- Isolated copper baseplate using DBC Direct Copper Bonding technology



Typical Applications

- Switching mode power supplies up to 40kHz
- Resonant inverters up to 100kHz
- Inductive heating
- UPS
- Electronic welders at $f_{sw} > 20kHz$

Equivalent Circuit Schematic

Absolute Maximum Ratings $T_c = 25^\circ C$ unless otherwise noted

Symbol	Description	GD300HFU120C2S	Units
V_{CES}	Collector-Emitter Voltage	1200	V

Symbol	Description	GD300HFU120C2S	Units
V_{GES}	Gate-Emitter Voltage	$\pm 20V$	V
I_C	Collector Current @25°C @80°C	400	A
		300	
$I_{CM(1)}$	Pulsed Collector Current @80°C	600	A
I_F	Diode Continuous Forward Current	300	A
I_{FM}	Diode Maximum Forward Current	600	A
P_D	Maximum power Dissipation @ Tc=25°C	1900	W
T_{SC}	Short Circuit Withstand Time @Tc=125°C	10	us
T_J	Operating Junction Temperature	-40 to +150	°C
T_{STG}	Storage Temperature Range	-40 to +125	°C
I^2t -value, Diode	$V_R=0V$, $t=10ms$, $T_J=125^\circ C$	18000	A ² s
V_{ISO}	Isolation Voltage RMS, f=50Hz, t=1min	2500	V
Mounting Torque	Power Terminal Screw:M6	2.5 to 5	N.m
	Mounting Screw:M6	3 to 5	N.m

Notes:

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

Electrical Characteristics of IGBT Tc=25°C unless otherwise noted**Off Characteristics**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$B_{V_{CES}}$	Collector-Emitter Breakdown Voltage	$T_J=25^\circ C$	1200			V
I_{CES}	Collector Cut-Off Current	$V_{CE}=V_{CES}$, $V_{GE}=0V$		0.20	0.50	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	$I_C=12mA$, $V_{CE}=V_{GE}$	4.4	5.02	6.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=300A$, $V_{GE}=15V$, @25°C		3.30	3.7	V
		$I_C=300A$, $V_{GE}=15V$, @125°C		3.65		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V$, $I_C=300A$, $R_G=2\Omega$, $V_{GE} = \pm 15V$, Inductive Load, $T_C = 25^\circ C$		62		ns
t_r	Rise Time			48		ns
$t_{d(off)}$	Turn-Off Delay Time			450		ns
t_f	Fall Time			30		ns

E_{on}	Turn-On Switching Loss			12		mJ
E_{off}	Turn-Off Switching Loss			14		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=200A, R_G=2\Omega, V_{GE} = \pm 15V$, Inductive Load, $T_C = 125^\circ C$		70		ns
t_r	Rise Time			50		ns
$t_{d(off)}$	Turn-Off Delay Time			470		ns
t_f	Fall Time			32		ns
E_{on}	Turn-On Switching Loss			15		mJ
E_{off}	Turn-Off Switching Loss			16		mJ
T_{SC}	Short Circuit Withstand Time	$V_{CC}=600V, V_{GE} = 20V@T_C = 125^\circ C$	10			us
C_{ies}	Input Capacitance	$V_{CE} = 25V, f=1MHz, V_{GE} = 0V$		20		nF
C_{oes}	Output Capacitance			3.0		nF
C_{res}	Reverse Transfer Capacitance			1.2		nF
L_{CE}	Stray inductance			15	20	nH
$R_{CC'+EE'}$	Module lead resistance, terminal to chip	$T_C = 125^\circ C$		0.5		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 =300A	T _C = 25°C		2.0	2.5	V
			T _C = 125°C		1.8		
t _{rr}	Diode Reverse Recovery Time	I _F =300A, V _R =600V, di/dt=-8000 A/us, V _{GE} =0V	T _C = 25°C		90		ns
			T _C = 125°C		---		
I _{rr}	Diode Peak Reverse Recovery Current		T _C = 25°C		200		A
			T _C = 125°C		280		
E _{rr}	Reverse Recovery Energy		T _C = 25°C		10		mJ
			T _C = 125°C		15		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (IGBT Part, per 1/2 Module)		0.050	$^\circ C/W$
$R_{\theta JC}$	Junction-to-Case (DIODE Part, per 1/2 Module)		0.124	$^\circ C/W$
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.035		$^\circ C/W$
Weight	Weight of Module	300		g

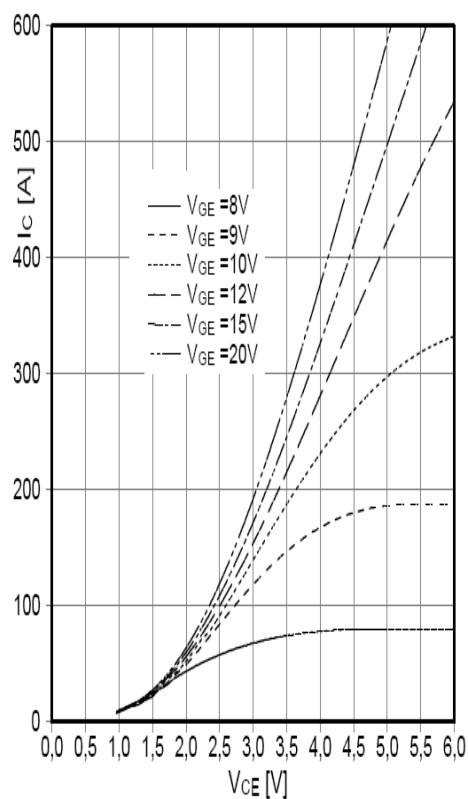


Fig 1. Typical Output Characteristics

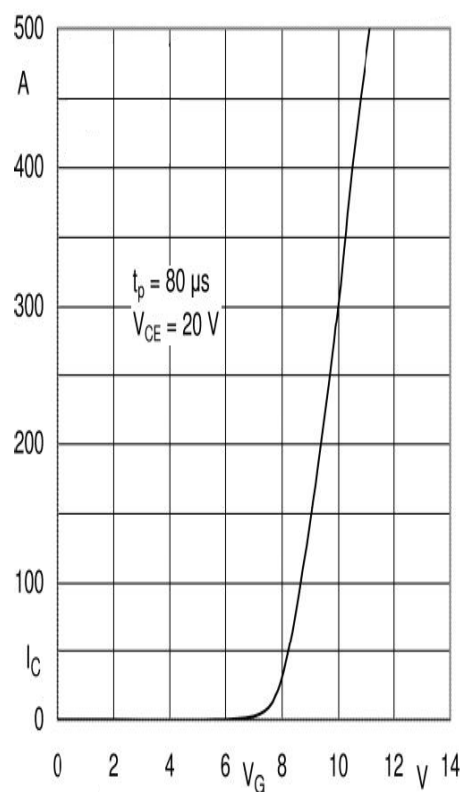


Fig 2. Typical transfer Characteristics

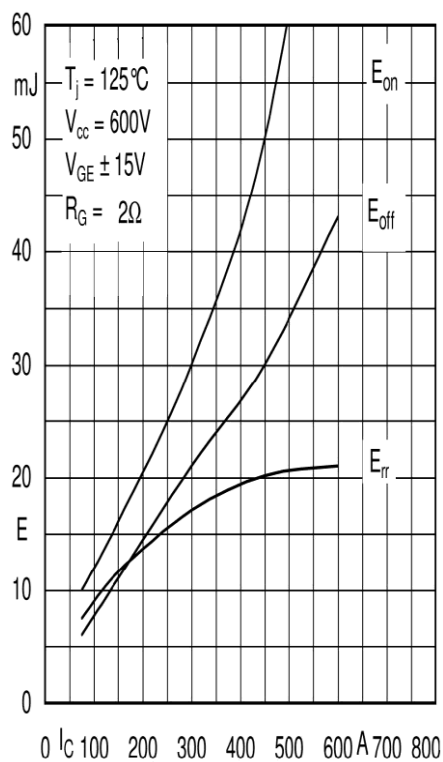


Fig 3. Switching Loss vs. Collector Current

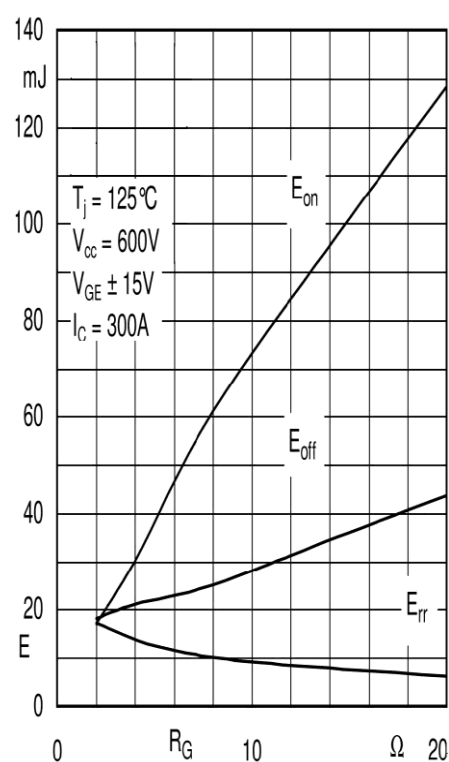


Fig 4. Switching Loss vs. Gate Resistance

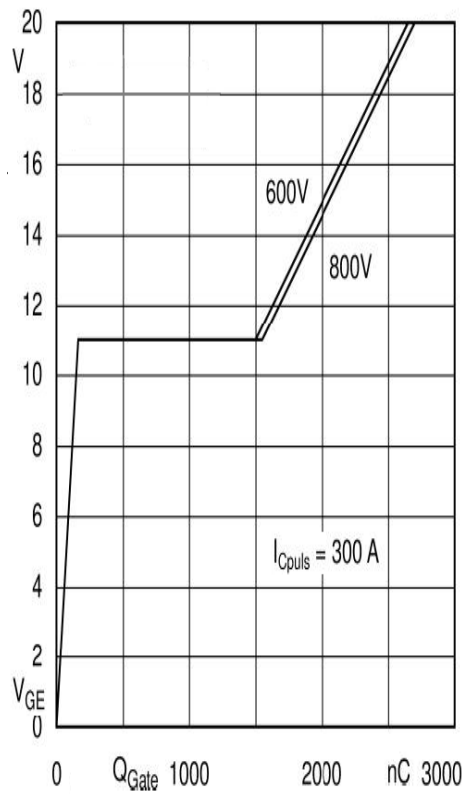


Fig 5. Gate Charge Characteristics.

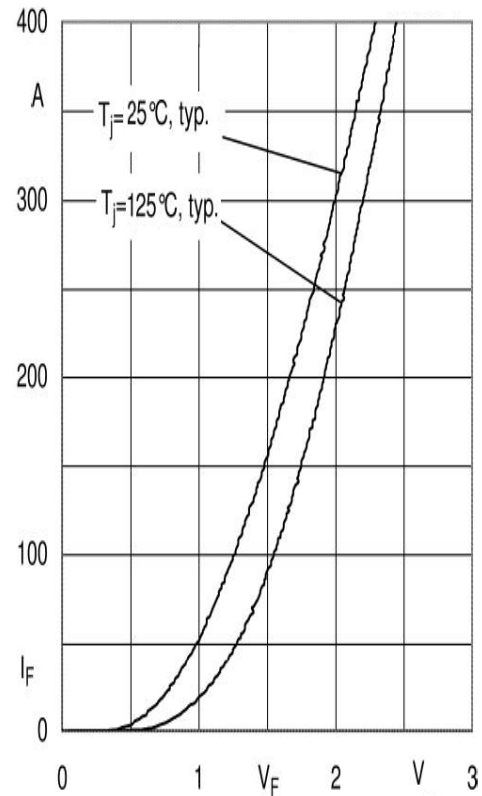
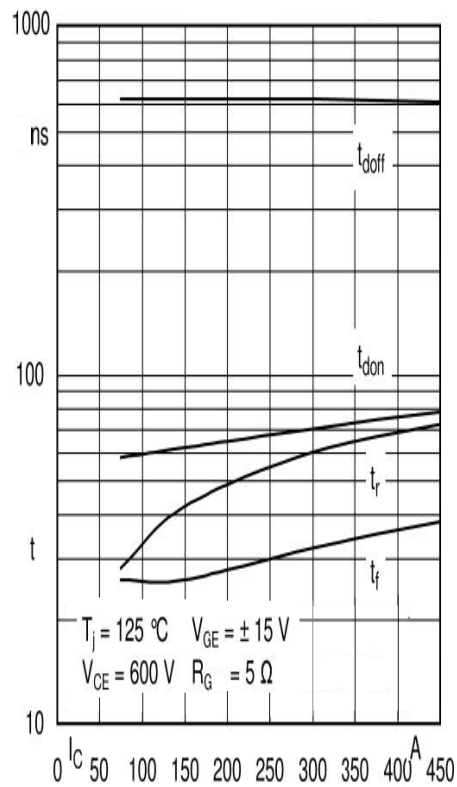
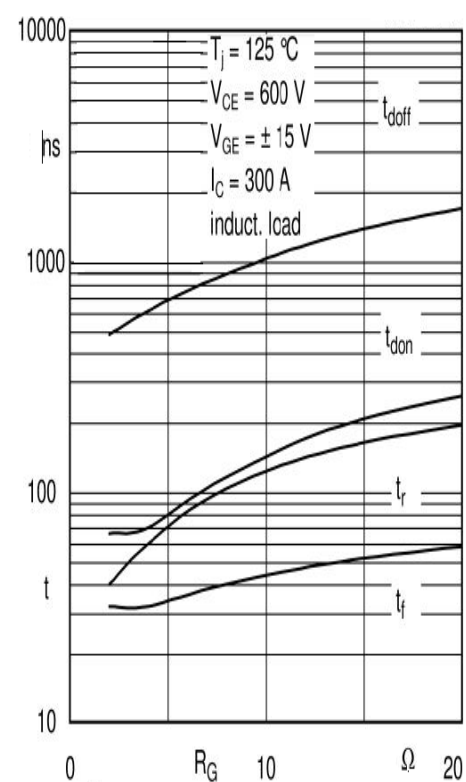


Fig 6. Diode Forward Characteristics

Fig 7. Typical Switching Times vs. I_C Fig 8. Typical Switching Times vs. R_G

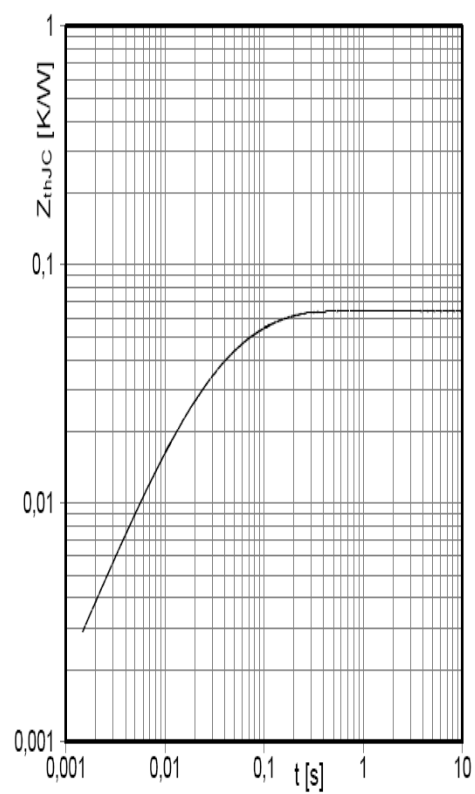


Fig 9. transient thermal impedance IGBT

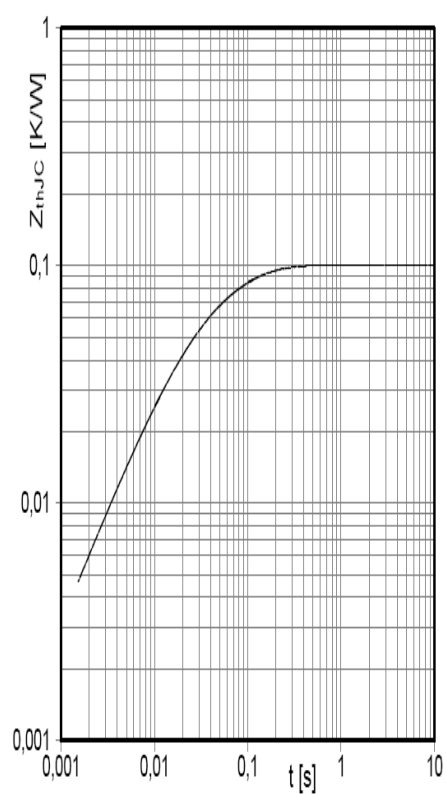
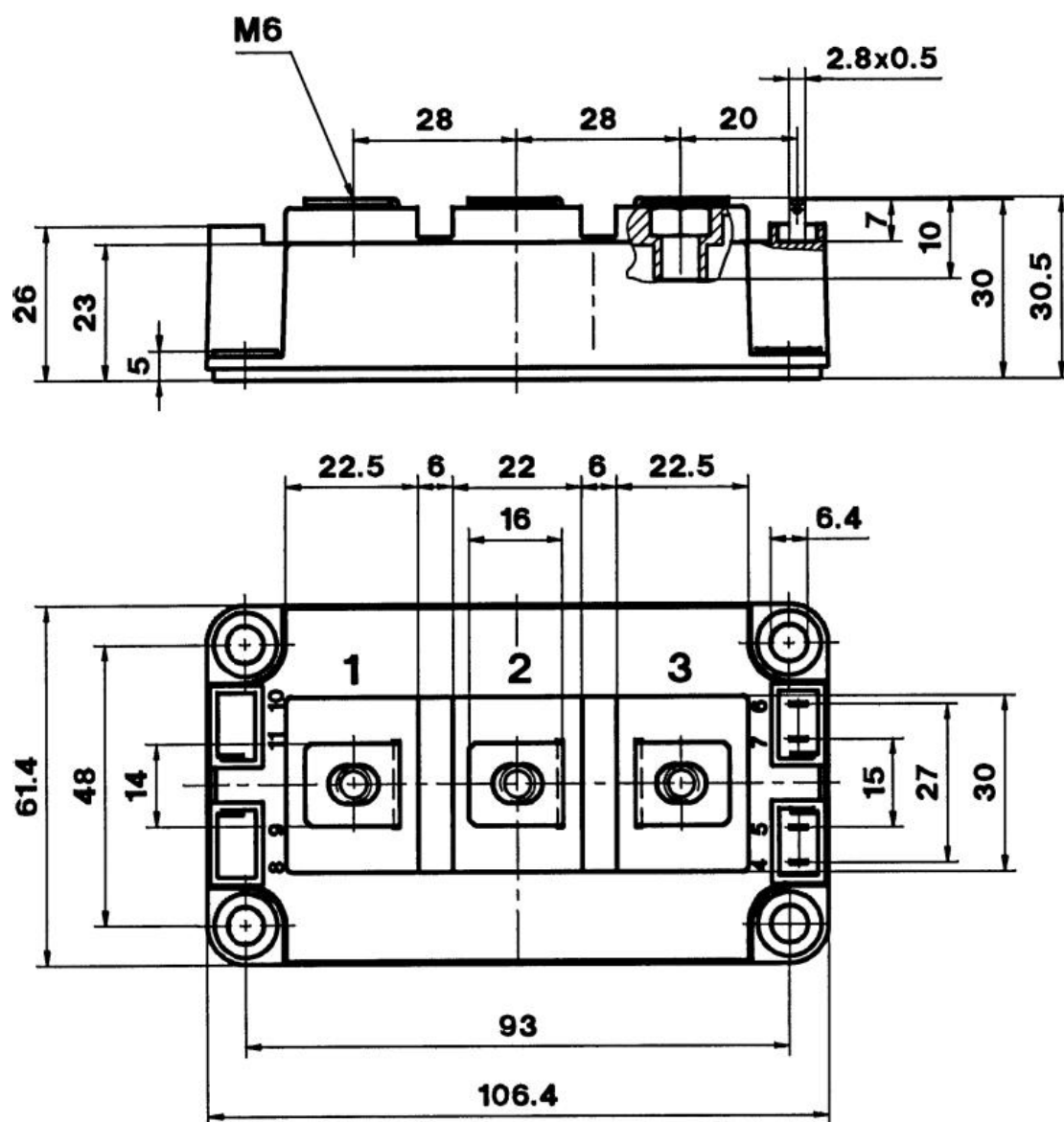


Fig 10. Transient thermal impedance diode

Package Dimension

Dimensions in Millimeters



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