

STARPOWER

SEMICONDUCTOR

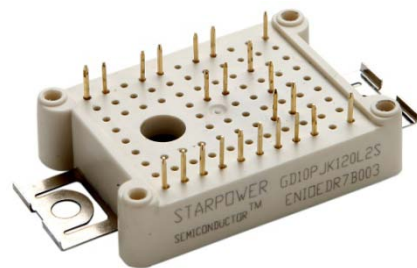
IGBT

GD30HCT60L2S

Molding Type Module**600V/30A 4 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 solar power.



Features

- Low $V_{CE(sat)}$ trench IGBT technology
- Low switching losses
- 5 μ s short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD

Typical Applications

- Switching mode power supply
- Solar power
- Electronic welder

IGBT-inverter $T_C=25^{\circ}\text{C}$ unless otherwise noted**Maximum Rated Values**

Symbol	Description	GD30HCT60L2S	Units
V_{CES}	Collector-Emitter Voltage @ $T_j=25^{\circ}\text{C}$	600	V
V_{GES}	Gate-Emitter Voltage @ $T_j=25^{\circ}\text{C}$	± 20	V
I_C	Collector Current @ $T_C=25^{\circ}\text{C}$ @ $T_C=80^{\circ}\text{C}$	55 30	A
I_{CM}	Pulsed Collector Current $t_p=1\text{ms}$	60	A
P_{tot}	Total Power Dissipation @ $T_j=175^{\circ}\text{C}$	152	W

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	$V_{CE}=V_{CES}, V_{GE}=0\text{V},$ $T_j=25^{\circ}\text{C}$			5.0	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	$I_C=1.0\text{mA}, V_{CE}=V_{GE},$ $T_j=25^{\circ}\text{C}$	4.0		6.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=35\text{A}, V_{GE}=15\text{V},$ $T_j=25^{\circ}\text{C}$		1.60	2.05	V
		$I_C=35\text{A}, V_{GE}=15\text{V},$ $T_j=175^{\circ}\text{C}$		2.00		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=400V, I_C=35A,$ $R_G=10\Omega, V_{GE}=\pm 15V,$ $T_j=25^\circ C$		46		ns
t_r	Rise Time			33		ns
$t_{d(off)}$	Turn-Off Delay Time			106		ns
t_f	Fall Time			45		ns
E_{on}	Turn-On Switching Loss			0.39		mJ
E_{off}	Turn-Off Switching Loss			0.63		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=400V, I_C=35A,$ $R_G=10\Omega, V_{GE}=\pm 15V,$ $T_j=125^\circ C$		46		ns
t_r	Rise Time			35		ns
$t_{d(off)}$	Turn-Off Delay Time			128		ns
t_f	Fall Time			62		ns
E_{on}	Turn-On Switching Loss			1.01		mJ
E_{off}	Turn-Off Switching Loss			0.93		mJ
C_{ies}	Input Capacitance	$V_{CE}=30V, f=1MHz,$ $V_{GE}=0V$		2113		pF
C_{oes}	Output Capacitance			197		pF
C_{res}	Reverse Transfer Capacitance			65		pF
Q_G	Gate Charge	$V_{CC}=400V, I_C=35A,$ $V_{GE}=15V$		69		nC
I_{SC}	SC Data	$t_p \leq 10\mu s, V_{GE}=15V,$ $T_j=125^\circ C, V_{CC}=360V,$ $V_{CEM} \leq 600V$		315		A

Diode-inverter $T_C=25^\circ C$ unless otherwise noted

Maximum Rated Values

Symbol	Description	GD30HCT60L2S	Units
V_{RRM}	Repetitive Peak Reverse Voltage @ $T_j=25^\circ C$	600	V
I_F	DC Forward Current	30	A
I_{FRM}	Repetitive Peak Forward Current $t_p=1ms$	60	A

Characteristics Values

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V _F	Diode Forward Voltage	I _F =30V _{GE} =0V	T _j =25℃		1.30	1.75	V
			T _j =125℃		1.25		
Q _r	Recovered Charge	I _F =30A	T _j =25℃		2.2		μC
			T _j =125℃		4.6		
I _{RM}	Peak Reverse Recovery Current	V _R =400V, R _G =10Ω, V _{GE} =-15V	T _j =25℃		38		A
			T _j =125℃		44		
E _{rec}	Reverse Recovery Energy		T _j =25℃		0.41		mJ
			T _j =125℃		0.92		

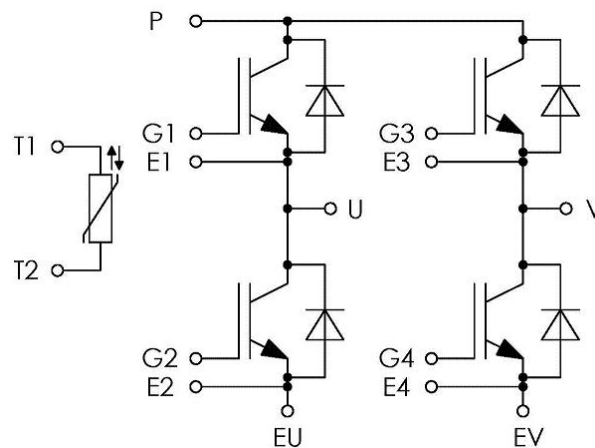
NTC $T_C=25^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
R_{25}	Rated Resistance			5.0		k Ω
$\Delta R/R$	Deviation of R_{100}	$T_C=100^{\circ}\text{C}$, $R_{100}=493.3\Omega$	-5		5	%
P_{25}	Power Dissipation				20.0	mW
$B_{25/50}$	B-value	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15\text{K}))]$		3375		K

IGBT Module

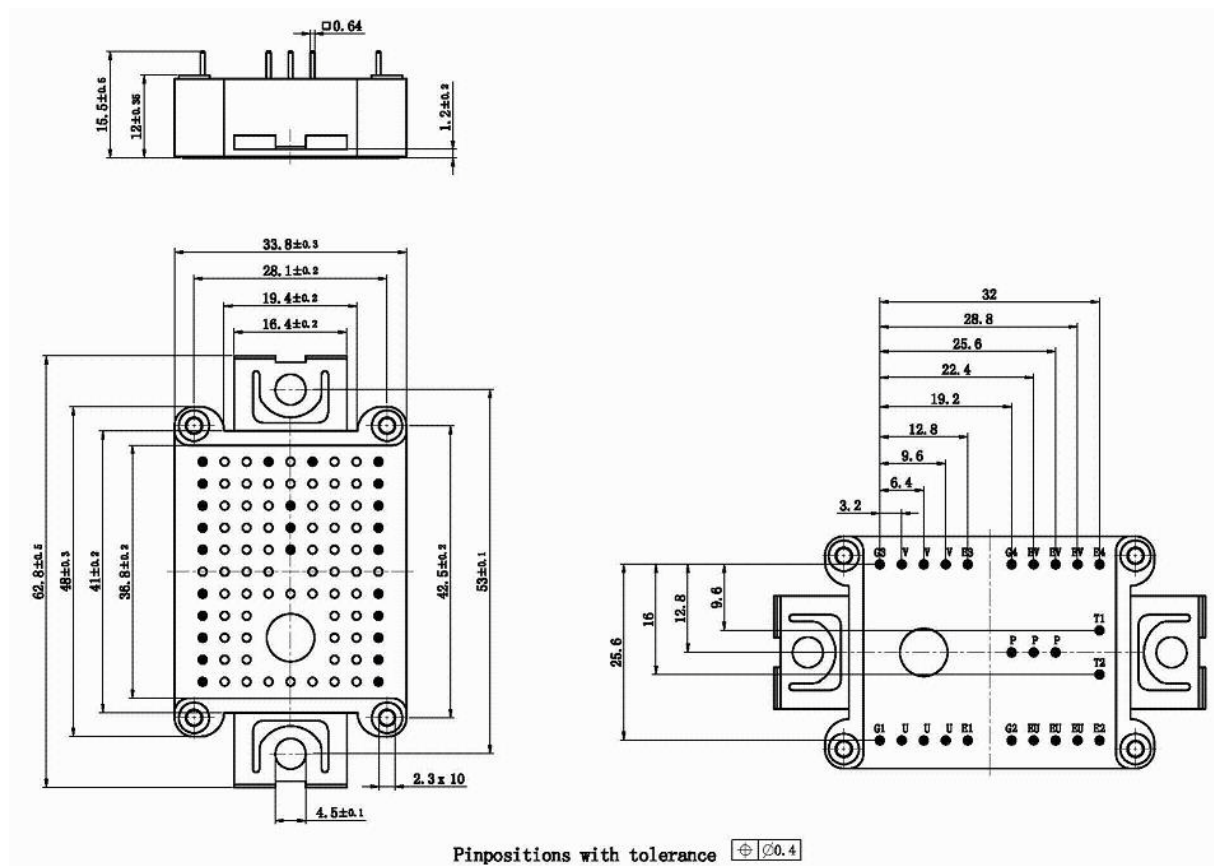
Symbol	Parameter	Min.	Typ.	Max.	Units
V_{ISO}	Isolation Voltage RMS, $f=50\text{Hz}$, $t=1\text{min}$	2500			V
L_{CE}	Stray Inductance		20		nH
$R_{\text{CC}'+\text{EE}'}$	Module Lead Resistance, Terminal to Chip @ $T_C=25^{\circ}\text{C}$		8.00		m Ω
$R_{\theta\text{JC}}$	Junction-to-Case (per IGBT-inverter) Junction-to-Case (per Diode-inverter)			0.988 1.560	K/W
$R_{\theta\text{CS}}$	Case-to-Sink (Conductive grease applied)		0.058		K/W
T_j	Maximum Junction Temperature			175	$^{\circ}\text{C}$
T_{jop}	Operating Junction Temperature	-40		150	$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range	-40		125	$^{\circ}\text{C}$
F	Mounting Force Per Clamp	20		50	N
G	Weight of Module		24		g

Equivalent Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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