

IGBT

GD15PJK120L1S

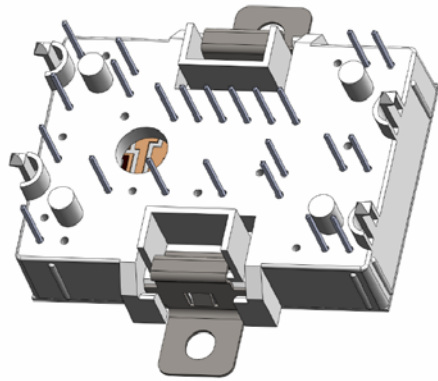
Preliminary

Molding Type Module

1200V/15A PIM in one-package

Features

- 10 μ s short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Square RBSOA
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD



Typical Applications

- Inverter for motor drive
- AC and DC servo drive amplifier
- Uninterruptible power supply

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

Symbol	Description	GD15PJK120L1S	Units
V_{CES}	Collector-Emitter Voltage @ $T_J=25^{\circ}\text{C}$	1200	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current @ $T_C=25^{\circ}\text{C}$	30	A
	@ $T_C=80^{\circ}\text{C}$	15	
I_{CM}	Pulsed Collector Current $t_p=1\text{ms}$	30	A
P_{tot}	Total Power Dissipation @ $T_J=150^{\circ}\text{C}$	147	W
T_{SC}	Short Circuit Withstand Time @ $T_J=150^{\circ}\text{C}$	10	μs

Off Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{CES}	Collector-Emitter Breakdown Voltage	$T_J=25^{\circ}\text{C}$	1200			V
I_{CES}	Collector Cut-Off Current	$V_{CE}=V_{CES}, V_{GE}=0\text{V},$ $T_J=25^{\circ}\text{C}$			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	$I_C=250\mu\text{A}, V_{CE}=V_{GE},$ $T_J=25^{\circ}\text{C}$	4.0	5.4	6.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=15\text{A}, V_{GE}=15\text{V},$ $T_J=25^{\circ}\text{C}$		2.46		V
		$I_C=15\text{A}, V_{GE}=15\text{V},$ $T_J=125^{\circ}\text{C}$		2.85		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
E_{on}	Turn-On Switching Loss	$V_{CC}=600\text{V}, I_C=15\text{A},$ $R_G=22\Omega, V_{GE}=\pm 15\text{V},$ $T_J=25^{\circ}\text{C}$		1.30		mJ
E_{off}	Turn-Off Switching Loss			0.90		mJ
E_{tot}	Total Switching Loss			2.20		mJ
E_{on}	Turn-On Switching Loss	$V_{CC}=600\text{V}, I_C=15\text{A},$ $R_G=22\Omega, V_{GE}=\pm 15\text{V},$ $T_J=125^{\circ}\text{C}$		1.70		mJ
E_{off}	Turn-Off Switching Loss			1.25		mJ
E_{tot}	Total Switching Loss			2.95		mJ

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$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=15A,$ $R_G=22\Omega, V_{GE} = \pm 15V,$ $T_J=125^\circ C$		50		ns
t_r	Rise Time			50		ns
$t_{d(off)}$	Turn-Off Delay Time			300		ns
t_f	Fall Time			220		ns
C_{ies}	Input Capacitance	$V_{CE}=30V, f=1Mhz,$ $V_{GE}=0V$		1285		pF
C_{oes}	Output Capacitance			280		pF
C_{res}	Reverse Transfer Capacitance			35		pF
I_{SC}	SC Data	$T_P \leq 10\mu s, V_{GE}=15V,$ $T_J=125^\circ C, V_{CC}=900V,$ $V_{CEM} \leq 1200V$		TBD		A

DIODE-inverter $T_C=25^\circ C$ unless otherwise noted**Maximum Rated Values**

Symbol	Description	GD15PJK120L1S	Units
V_{RRM}	Collector-Emitter Voltage @ $T_J=25^\circ C$	1200	V
I_F	DC Forward Current	15	A
I_{FRM}	Repetitive Peak Forward Current $t_p=1ms$	30	A
I^2t	I^2t -value, $V_R=0V, t_p=10ms, T_J=125^\circ C$	50	A^2s

Characteristics Values

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V _F	Diode Forward Voltage	I _F =15A,V _{GE} =0V	T _j =25℃		2.05		V
			T _j =125℃		2.15		
Q _{rr}	Diode Reverse Recovery Charge	I _F =15A, V _R =600V, di/dt=-900A/μs, V _{GE} =-15V	T _j =25℃		1.6		μC
			T _j =125℃		2.8		
I _{RM}	Diode Peak Reverse Recovery Current		T _j =25℃		28		A
			T _j =125℃		27		
E _{rec}	Reverse Recovery Energy		T _j =25℃		0.5		mJ
			T _j =125℃		1.0		

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

Symbol	Description	GD15PJK120L1S	Units
V_{RRM}	Collector-Emitter Voltage @ $T_j=25^{\circ}\text{C}$	1600	V
$I_{F\text{ RMSM}}$	Forward Current RMS Maximum Per Diode @ $T_C=80^{\circ}\text{C}$	25	A
I_{RMSM}	Maximum RMS Current at Rectifier output @ $T_C=80^{\circ}\text{C}$	25	A
I_{FSM}	Surge Forward Current $V_R=0\text{V}$, $t_p=10\text{ms}$, $T_j=45^{\circ}\text{C}$	270	A
I^2t	I^2t -value, $V_R=0\text{V}$, $t_p=10\text{ms}$, $T_j=45^{\circ}\text{C}$	360	A^2s

Characteristics Values

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	$I_F=30\text{A}$	$T_j=25^{\circ}\text{C}$	1.29		V
			$T_j=125^{\circ}\text{C}$	1.31		
I_R	Reverse Current	$T_j=25^{\circ}\text{C}$, $V_R=1600\text{V}$			1	mA

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

Symbol	Description	GD15PJK120L1S	Units
V_{CES}	Collector-Emitter Voltage @ $T_j=25^{\circ}\text{C}$	1200	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current @ $T_C=25^{\circ}\text{C}$	30	A
	@ $T_C=80^{\circ}\text{C}$	15	
I_{CM}	Pulsed Collector Current $t_p=1\text{ms}$	30	A
P_{tot}	Total Power Dissipation @ $T_j=150^{\circ}\text{C}$	156	W
T_{SC}	Short Circuit Withstand Time @ $T_j=150^{\circ}\text{C}$	10	μs

Off Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{CES}	Collector-Emitter Breakdown Voltage	$T_j=25^{\circ}\text{C}$	1200			V
I_{CES}	Collector Cut-Off Current	$V_{CE}=V_{CES}$, $V_{GE}=0\text{V}$, $T_j=25^{\circ}\text{C}$			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	$I_C=250\mu A, V_{CE}=V_{GE},$ $T_J=25^\circ C$	4.0	5.4	6.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=15A, V_{GE}=15V,$ $T_J=25^\circ C$		2.46		V
		$I_C=15A, V_{GE}=15V,$ $T_J=125^\circ C$		2.85		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
E_{on}	Turn-On Switching Loss	$V_{CC}=600V, I_C=15A,$ $R_G=22\Omega, V_{GE} = \pm 15V,$ $T_J=25^\circ C$		1.30		mJ
E_{off}	Turn-Off Switching Loss			0.90		mJ
E_{tot}	Total Switching Loss			2.20		mJ
E_{on}	Turn-On Switching Loss	$V_{CC}=600V, I_C=15A,$ $R_G=22\Omega, V_{GE} = \pm 15V,$ $T_J=125^\circ C$		1.70		mJ
E_{off}	Turn-Off Switching Loss			1.25		mJ
E_{tot}	Total Switching Loss			2.95		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=15A,$ $R_G=22\Omega, V_{GE} = \pm 15V,$ $T_J=125^\circ C$		50		ns
t_r	Rise Time			50		ns
$t_{d(off)}$	Turn-Off Delay Time			300		ns
t_f	Fall Time			220		ns
C_{ies}	Input Capacitance	$V_{CE}=30V, f=1Mhz,$ $V_{GE}=0V$		1285		pF
C_{oes}	Output Capacitance			280		pF
C_{res}	Reverse Transfer Capacitance			35		pF
I_{SC}	SC Data	$T_P \leq 10\mu s, V_{GE}=15V,$ $T_J=125^\circ C, V_{CC}=900V,$ $V_{CEM} \leq 1200V$		TBD		A

DIODE-brake-chopper $T_C=25^{\circ}\text{C}$ unless otherwise noted**Maximum Rated Values**

Symbol	Description	GD15PJK120L1S	Units
V_{RRM}	Collector-Emitter Voltage @ $T_J=25^{\circ}\text{C}$	1200	V
I_F	DC Forward Current	15	A
I_{FRM}	Repetitive Peak Forward Current $t_p=1\text{ms}$	30	A
I^2t	I^2t -value, $V_R=0\text{V}$, $t_p=10\text{ms}$, $T_J=125^{\circ}\text{C}$	20	A^2s

Characteristics Values

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V _F	Diode Forward Voltage	I _F =15A, V _{GE} =0V	T _J =25°C		2.05		V
			T _J =125°C		2.30		
Q _r	Diode Reverse Recovered charge	I _F =15A, V _R =600V, di/dt=-300A/μs, V _{GE} =-15V	T _J =25°C		1.5		μC
			T _J =125°C		2.9		
I _{RM}	Diode Peak Reverse Recovery Current		T _J =25°C		15		A
			T _J =125°C		15		
E _{rec}	Reverse Recovery Energy		T _J =25°C		0.5		mJ
			T _J =125°C		1.1		

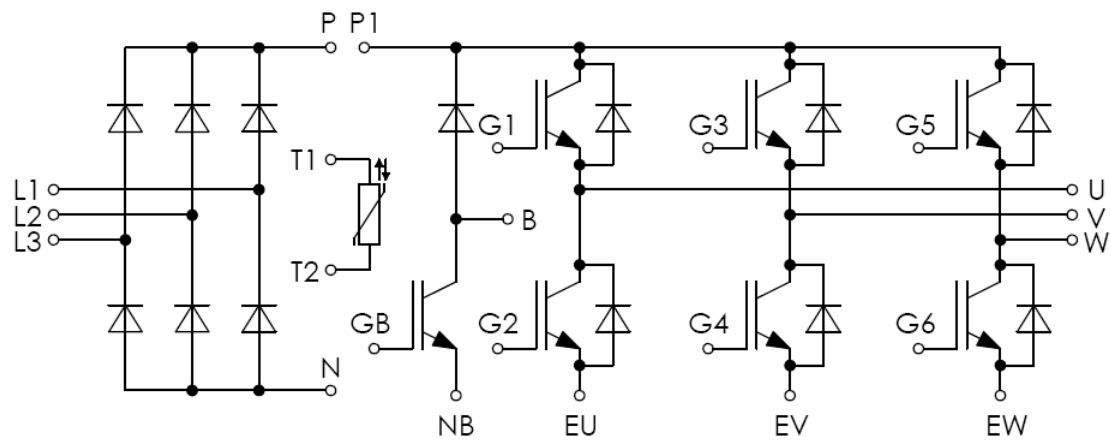
Electrical Characteristics of NTC $T_C=25^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
R_{25}	Rated resistance			5.0		$\text{k}\Omega$
$\Delta R/R$	Deviation of R_{100}	$R_{100}=493.3\Omega$	-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		40		nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip @ $T_C=25^\circ\text{C}$		10		m Ω
$R_{\theta JC}$	Junction-to-Case (per IGBT-inverter)			0.85	K/W
	Junction-to-Case (per DIODE-inverter)			1.61	
	Junction-to-Case (per DIODE-rectifier)			1.08	
	Junction-to-Case (per IGBT-brake-chopper)			0.80	
	Junction-to-Case (per DIODE-brake-chopper)			1.92	
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)		0.03		K/W
T_j	Maximum Junction Temperature			150	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-40		125	$^\circ\text{C}$
F	Mounting Force Per Clamp	40		80	N
G	Weight of Module		36		g

Equivalent Circuit Schematic



Package Dimension

Dimensions in Millimeters

