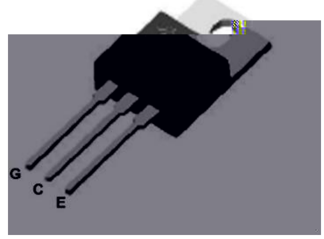
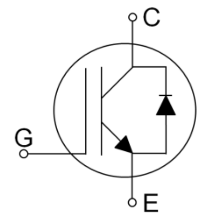
Features

- 600V Field Stop Trench IGBT Technology
- High Speed Switching
- Low Conduction Loss
- Positive Temperature Coefficient
- Easy Parallel Operation
- Short Circuit Withstanding Time 5 s
- 175℃ Operating Temperature
- RoHS Compliant
- JEDEC Qualification

TO-220





Applications

Motor Drive, Air Conditioner, Inverter, Solar

Device	Package	Marking	Remark
TGP20N60FDRS	TO-220	TGP20N60FDRS	RoHS

Absolute Maximum Ratings

Parameter		Symbol	Value	Unit
Collector-Emitter Voltage		V_{CES}	600	V
Gate-Emitter Voltage		V_{GES}	20	V
Continuous Collector Current	T_C = 25 ℃	I_C	36	A
	T_C = 100 ℃		18	A
Pulsed Collector Current (Note 1)		I_{CM}	50	A
Diode Continuous Forward Current	T_C = 100 ℃	I_F	18	A
Diode Pulsed Forward Current (Note 1)		I_{FM}	100	A
Power Dissipation	T_C = 25 ℃	P_D	100	W
	T_C = 100 ℃		50	W
Operating Junction Temperature		T_{vj}	-55 ~ 175	℃
Storage Temperature Range		T_{STG}	-55 ~ 150	℃
Maximum lead temperature for soldering purposes,		T_L	300	℃

Thermal Characteristics

Parameter	Symbol	Value	Unit
Maximum Thermal resistance, Junction-to-Case	R_{JC} (IGBT)	1.50	℃/W
Maximum Thermal resistance, Junction-to-Case	R_{JC} (DIODE)	2.35	℃/W
Maximum Thermal resistance, Junction-to-Ambient	R_{JA}	62.5	℃/W

Electrical Characteristics of the IGBT T_{vj}=25 , unless otherwise noted

Parameter	Symbol	Test condition	Min.	Typ.	Max.	Unit
OFF						
Collector Emitter Breakdown Voltage	BV_{CES}	V_{GE} = 0V, I_C = 1mA	600	--	--	V
Zero Gate Voltage Collector Current	I_{CES}	V_{CE} = 600V, V_{GE} = 0V	--	--	1	mA
Gate Emitter Leakage Current	I_{GES}	V_{CE} = 0V, V_{GE} = ± 20V	--	--	± 250	nA
Integrated Gate Resistance	$R_{G(int)}$	f = 1MHz, Open Collector	--	14.5	--	
ON						
Gate Emitter Threshold Voltage	$V_{GE(TH)}$	V_{GE} = V_{CE}, I_C = 18mA	4.5	6.0	7.5	V
Collector Emitter Saturation Voltage	$V_{CE(SAT)}$	V_{GE} = 15V, I_C = 18A, T_{vj} = 25 ℃	--	1.65	2.15	V
		V_{GE} = 15V, I_C = 18A, T_{vj} = 125 ℃	--	1.95	--	
		V_{GE} = 15V, I_C = 18A, T_{vj} = 175 ℃	--	2.05	--	V
DYNAMIC						
Input Capacitance	C_{IES}	V_{CE} = 30V V_{GE} = 0V f = 1MHz	--	780	--	pF
Output Capacitance	C_{OES}		--	65	--	pF
Reverse Transfer Capacitance	C_{RES}		--	40	--	pF
Total Gate Charge	Q_g	V_{CC} = 400V, I_C = 18A V_{GE} = 15V	--	70	105	nC
Gate-Emitter Charge	Q_{ge}		--	7	11	nC
Gate-Collector Charge	Q_{gc}		--	42	63	nC
SWITCHING (Note 2)						
Turn-On Delay Time	$t_{d(on)}$	V_{CC} = 400V, I_C = 9A R_G = 5 , V_{GE} = 15V Inductive Load, T_{vj} = 25 ℃	--	11	--	ns
Rise Time	t_r		--	11	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	119	--	ns
Fall Time	t_f		--	18	--	ns
Turn-On Switching Loss	E_{ON}		--	0.18	--	mJ
Turn-Off Switching Loss	E_{OFF}		--	0.08	--	mJ
Total Switching Loss	E_{TS}		--	0.26	--	mJ
Turn-On Delay Time	$t_{d(on)}$	V_{CC} = 400V, I_C = 18A R_G = 5 , V_{GE} = 15V Inductive Load, T_{vj} = 25 ℃	--	12	--	ns
Rise Time	t_r		--	18	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	107	--	ns
Fall Time	t_f		--	22	--	ns
Turn-On Switching Loss	E_{ON}		--	0.40	0.60	mJ
Turn-Off Switching Loss	E_{OFF}		--	0.20	0.30	mJ
Total Switching Loss	E_{TS}		--	0.60	0.90	mJ

Electrical Characteristics of the DIODE T_{vj}=25 , unless otherwise noted

Parameter	Symbol	Test condition	Min.	Typ.		

IGBT Characteristics

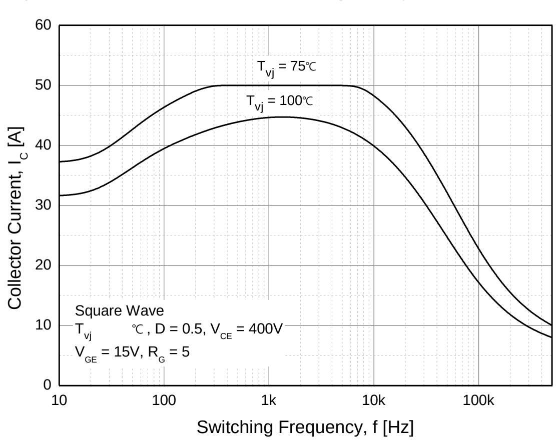
Fig. 13 Gate Charge Characteristics

Fig. 14 SOA

Fig. 15 RBSOA

Fig. 16 Transient Thermal Impedance of IGBT

Fig. 17 Load Current vs. Frequency



DIODE Characteristics

Fig. 18 Diode Conduction Characteristics

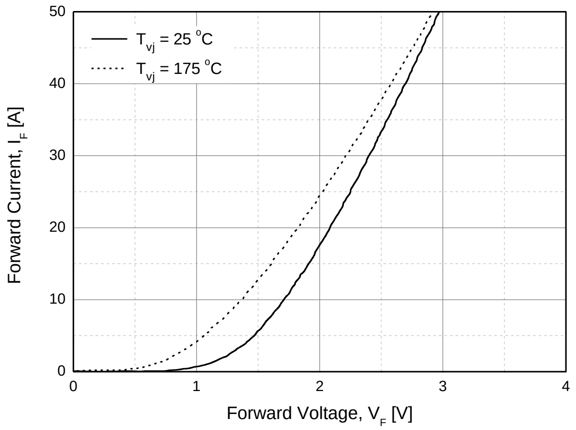


Fig. 19 Reverse Recovery Current vs. Forward Current

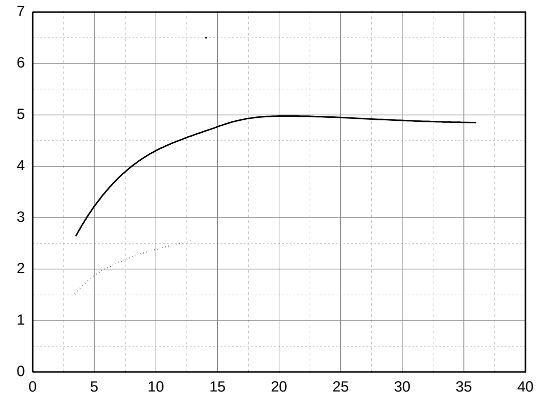


Fig. 20 Reverse Recovery Charge vs. Forward Current

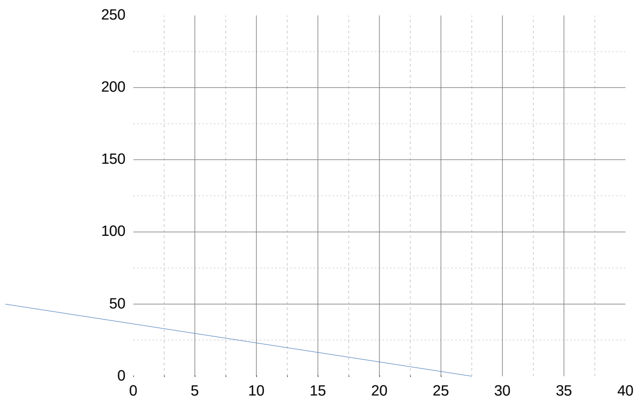


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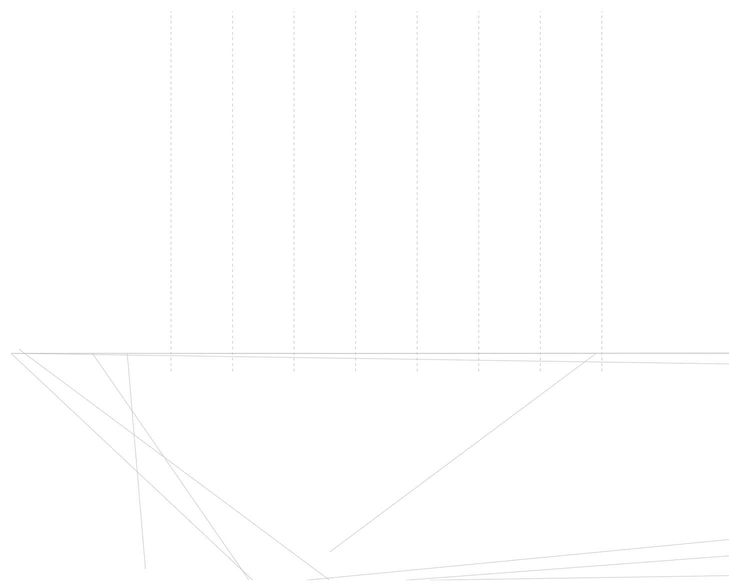
Fig. 21 Reverse Recovery Time vs. Forward Current



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