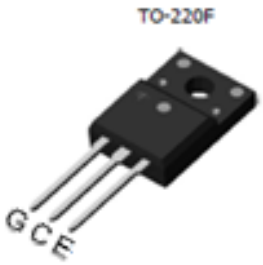
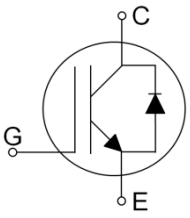
TGPF15N60FDR
Field Stop Trench IGBT

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





Applications

Motor Drive, Air Conditioner, Inverter, Solar

Device	Package	Marking	Remark
TGPF15N60FDR	TO-220F	TGPF15N60FDR	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	30	A
	T_C = 100 ℃		15	A
Pulsed Collector Current (Note 1)		I_{CM}	45	A
Diode Continuous Forward Current	T_C = 100 ℃	I_F	15	A
Diode Pulsed Forward Current (Note 1)		I_{FM}	100	A
Power Dissipation	T_C = 25 ℃	P_D	44	W
	T_C = 100 ℃		22	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)	3.4	℃/W
Maximum Thermal resistance, Junction-to-Case	R_{JC} (DIODE)	4.9	℃/W
Maximum Thermal resistance, Junction-to-Ambient	R_{JA}	62.5	℃/W

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 = 15mA	4.5	6.0	7.5	V
Collector Emitter SatSatiage						

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

Parameter	Symbol	Test condition	Min.	Typ.	Max.	Unit
SWITCHING (Note 2)						
Turn-On Delay Time	$t_{d(on)}$	V_{CC} = 400V, I_C = 7.5A R_G = 5 , V_{GE} = 15V				

on5-3(1)l TJETO EMCID 12/Lang (en-US)>BDC g0.030008047 0 540 720 reW*nBT/F2 9 Tf1 0 0 1 389.83 614.9 Tm0 g0 G[395lS5GE91

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

Parameter	Symbol	Test condition	Min.	Typ.	Max.	Unit
Diode Forward Voltage	V_{FM}	I_F = 7.5A, T_{vj} = 25 ℃	--	1.59	--	V
		I_F = 7.5A, T_{vj} = 125 ℃	--	1.35	--	V
		I_F = 7.5A, T_{vj} = 175 ℃	--	1.21	--	V
		I_F = 15A, T_{vj} = 25 ℃	--	1.91	--	V
		I_F = 15A, T_{vj} = 125 ℃	--	1.69	--	V
		I_F = 15A, T_{vj} = 175 ℃	--	1.61	--	V
Reverse Recovery Time	t_{rr}	I_F = 7.5A, di/dt = 200A/μs, T_{vj} = 25 ℃	--	46	--	ns
Reverse Recovery Current	I_{rr}		--	3.9	--	A
Reverse Recovery Charge	Q_{rr}		--	99	--	nC
Reverse Recovery Time	t_{rr}	I_F = 7.5A, di/dt = 200A/μs, T_{vj} = 175 ℃	--	109	--	ns
Reverse Recovery Current	I_{rr}		--	8.0	--	A
Reverse Recovery Charge	Q_{rr}		--	525	--	nC
Reverse Recovery Time	t_{rr}	I_F = 15A, di/dt = 200A/μs, T_{vj} = 25 ℃	--	50	--	ns
Reverse Recovery Current	I_{rr}		--	4.8	--	A
Reverse Recovery Charge	Q_{rr}		--	143	--	nC
Reverse Recovery Time	t_{rr}	I_F = 15A, di/dt = 200A/μs, T_{vj} = 175 ℃	--	121	--	ns
Reverse Recovery Current	I_{rr}		--	10.0	--	A
Reverse Recovery Charge	Q_{rr}		--	695	--	nC

IGBT Characteristics

Fig. 7 Turn-on Time vs. Gate Resistor

Fig. 8 Turn-off Time vs. Gate Resistor

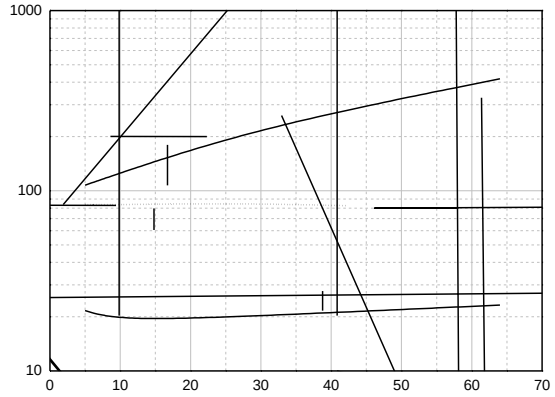


Fig. 9 Switching Loss vs. Gate Resistor

Fig. 10 Turn-on Time vs. Collector Current

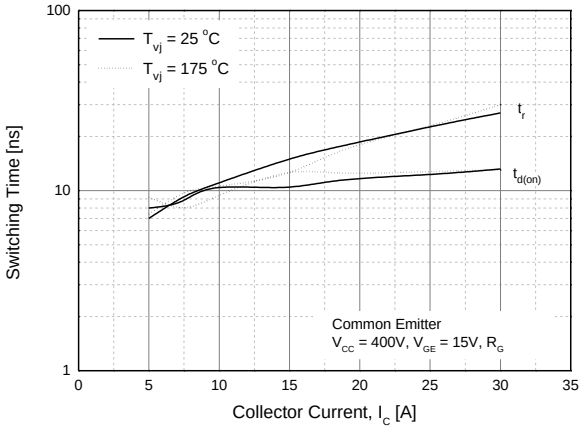


Fig. 11 Turn-off Time vs. Collector Current

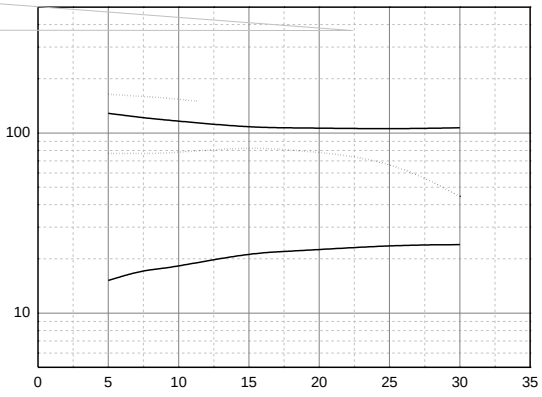
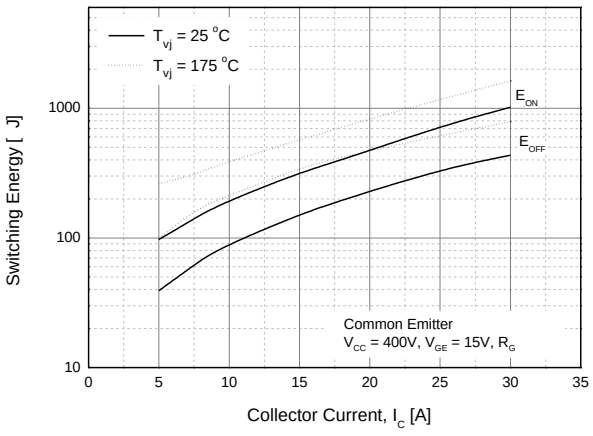


Fig. 12 Switching Loss vs. Collector Current



IGBT Characteristics

Fig. 13 Gate Charge Characteristics

Fig. 14 SOA

Fig. 15 RBSOA

Fig. 16 Transient Thermal Impedance of IGBT

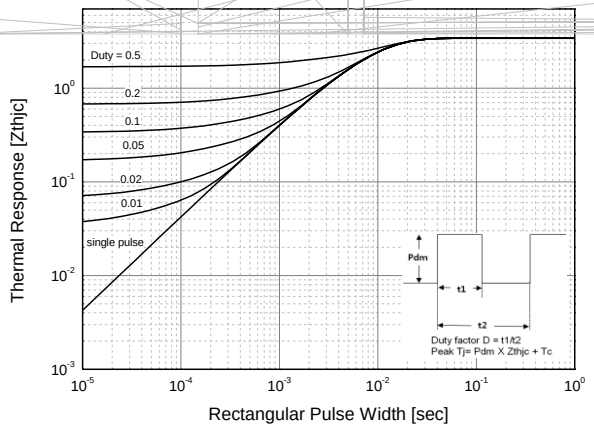
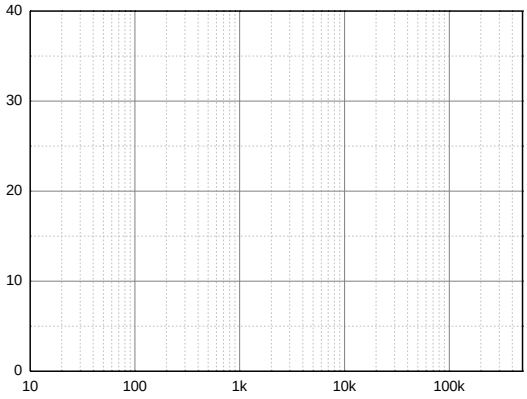


Fig. 17 Load Current vs. Frequency



DIODE Characteristics

Fig. 18 Diode Conduction Characteristics

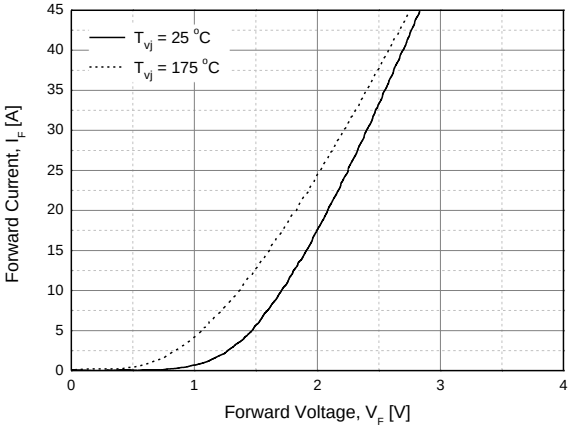


Fig. 19 Reverse Recovery Current vs. Forward Current

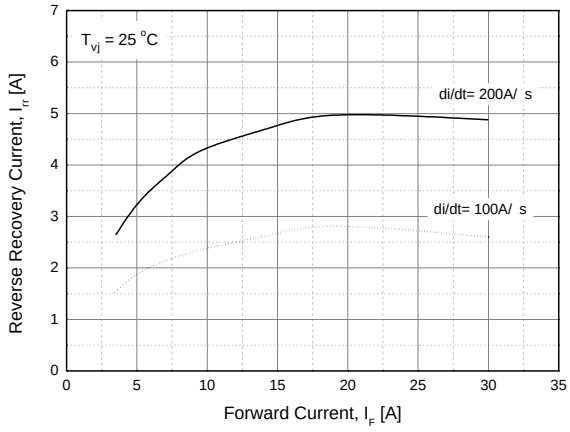
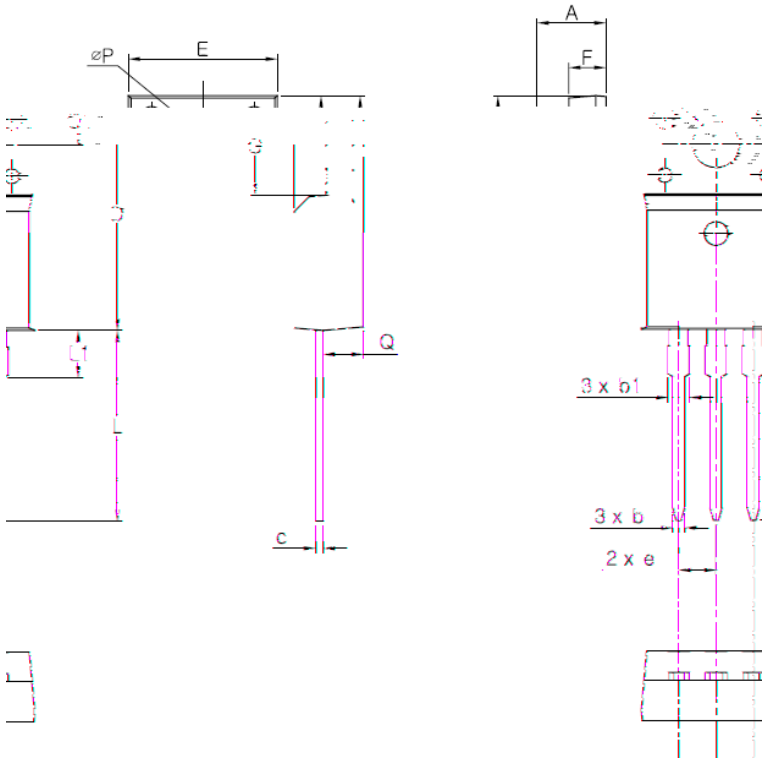


Fig. 20 Reverse Recovery Charge vs. Forward Current

Fig. 21 Reverse Recovery Time vs. Forward Current

TO-220F-3L MECHANICAL DATA



SYMBOL	MIN	MAX
A	4.50	4.93
b	0.70	0.91
b1	1.15	1.47
c	0.36	0.60
D	15.67	16.07
E	6.96	10.36
e	2.54 BSC	
F	2.34	2.74
G	6.48	6.90
L	12.37	13.18
L1	2.23	3.43
Q	2.56	2.96
Q1	3.10	3.50
ØP	2.98	3.38

Disclaimer

TRinno technology reserves the right to make changes without notice to products herein to improve reliability, performance, or design. The information given in this document is believed to be accurate and reliable. However, it shall in no event be regarded as a guarantee of conditions and characteristics. With respect to any information regarding the application of the device, TRinno technology hereby disclaims any and all warranties and liabilities of any kind, including without limitation, warranties of non-infringement of patent rights of any third party.