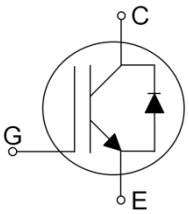
TGAN30N60FDR
Field Stop Trench IGBT

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



Applications
UPS, Welder, Inverter, Solar

Device	Package	Marking	Remark
TGAN30N60FDR	TO-3PN	TGAN30N60FDR	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	60	A
	T_C = 100		30	A
Pulsed Collector Current (Note 1)		I_{CM}	90	A
Diode Continuous Forward Current	T_C = 100	I_F	30	A
Power Dissipation	T_C = 25	P_D	231	W
	T_C = 100		93	W
Operating Junction Temperature		T_J	-55 ~ 150	
Storage Temperature Range		T_{STG}	-55 ~ 150	
Maximum lead temperature for soldering purposes,		T_L	300	

Notes :
(1) Repetitive rating : Pulse width limited by maximum junction temperature

Thermal Characteristics

Parameter	Symbol	Value	Unit
Maximum Thermal resistance, Junction-to-Case	R_{JC} (IGBT)	0.54	/W
Maximum Thermal resistance, Junction-to-Case	R_{JC} (DIODE)	1.12	/W
Maximum Thermal resistance, Junction-to-Ambient	R_{JA}	40	/W

Electrical Characteristics of the IGBT T_C=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
ON						
Gate Emitter Threshold Voltage	$V_{GE(TH)}$	V_{GE} = V_{CE}, I_C = 30mA	4.5	6.0	7.5	V
Collector Emitter Saturation Voltage	$V_{CE(SAT)}$	V_{GE} = 15V, I_C = 30A, T_C = 25	--	1.5	2.0	V
		V_{GE} = 15V, I_C = 30A, T_C = 150	--	1.8	--	V
DYNAMIC						
Input Capacitance	C_{IES}	V_{CE} = 30V, V_{GE} = 0V f = 1MHz	--	2000	--	pF
Output Capacitance	C_{OES}		--	135	--	pF
Reverse Transfer Capacitance	C_{RES}		--	80	--	pF
SWITCHING (Note 2)						
Turn-On Delay Time	$t_{d(on)}$	V_{CC} = 400V, I_C = 30A R_G = 10 , V_{GE} = 15V Inductive Load, T_C = 25	--	30	--	ns
Rise Time	t_r		--	45	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	135	--	ns
Fall Time	t_f		--	40	60	ns
Turn-On Switching Loss	E_{ON}		--	1.00	1.50	mJ
Turn-Off Switching Loss	E_{OFF}		--	0.66	0.99	mJ
Total Switching Loss	E_{TS}		--	1.66	2.49	mJ
Turn-On Delay Time	$t_{d(on)}$	V_{CC} = 400V, I_C = 30A R_G = 10 , V_{GE} = 15V Inductive Load, T_C = 150	--	30	--	ns
Rise Time	t_r		--	50	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	145	--	ns
Fall Time	t_f		--	130	--	ns
Turn-On Switching Loss	E_{ON}		--	1.07	1.60	mJ
Turn-Off Switching Loss	E_{OFF}		--	1.00	1.50	mJ
Total Switching Loss	E_{TS}		--	2.07	3.10	mJ
Total Gate Charge	Q_g	V_{CC} = 400V, I_C = 30A V_{GE} = 15V	--	120	180	nC
Gate-Emitter Charge	Q_{ge}		--	12	18	nC
Gate-Collector Charge	Q_{gc}		--	70	105	nC
Short Circuit Withstanding Time	t_{SC}	V_{CC} = 300V, V_{GE} = 15V, T_C = 125	5	10	--	s

Notes :
(2) Not subject to production test verified by design/characterization

IGBT Characteristics

Fig. 1 Output characteristics

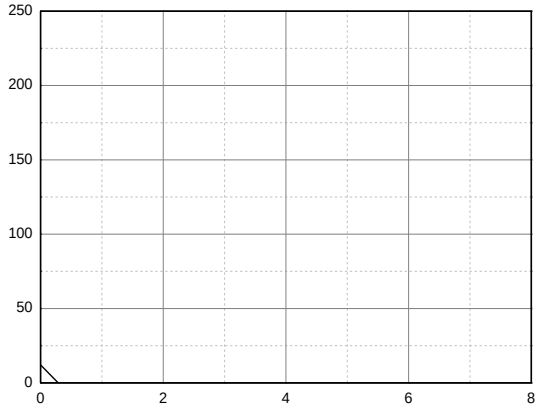


Fig. 2 Saturation voltage characteristics

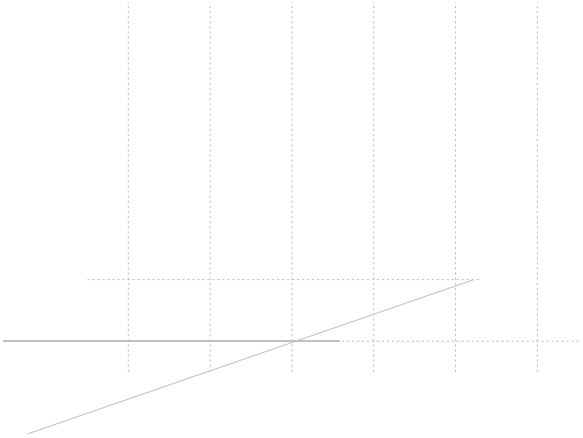


Fig. 3 Saturation voltage vs. collector current

Fig. 4 Saturation voltage vs. gate bias

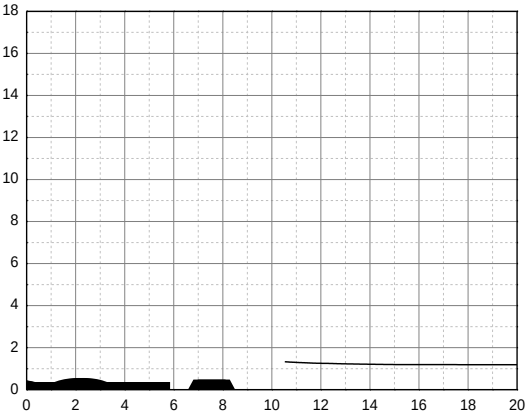


Fig. 5 Saturation voltage vs. gate bias

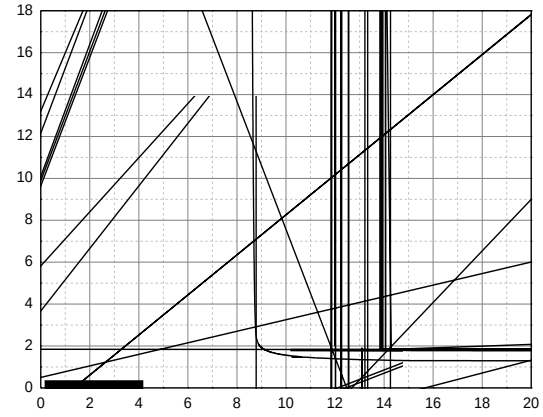
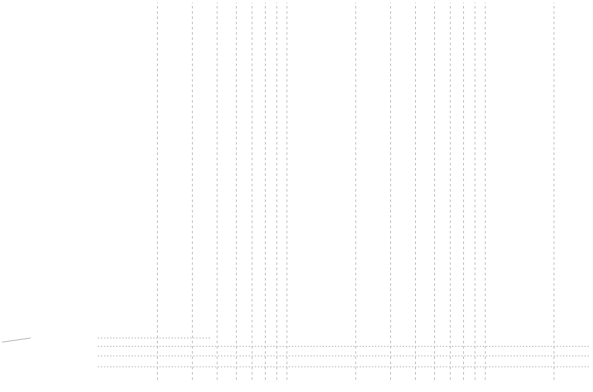


Fig. 6 Capacitance characteristics



IGBT Characteristics

Fig. 7 Turn-on time vs. gate resistor

Fig. 8 Turn-off time vs. gate resistor

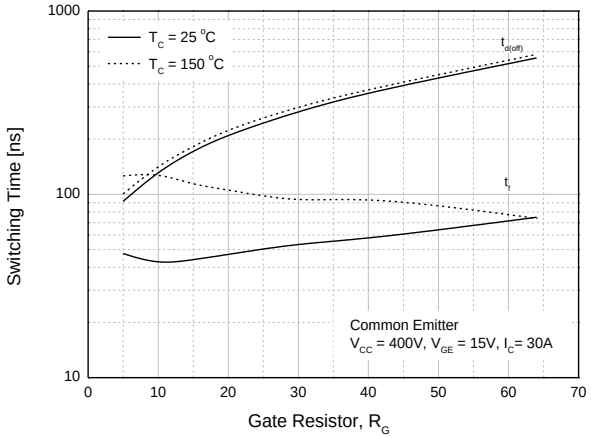


Fig. 9 Switching loss vs. gate resistor

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

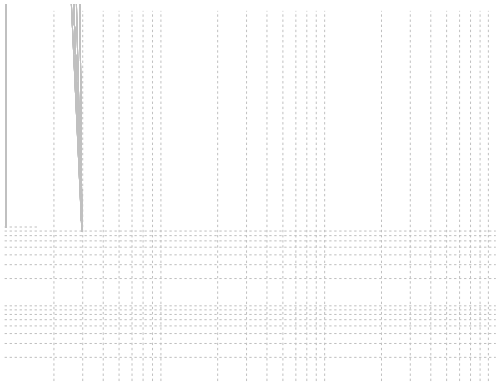


Fig. 15 RBSOA

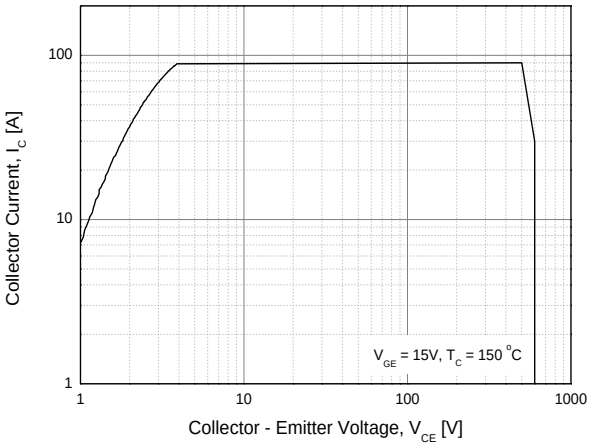


Fig. 16 Transient thermal impedance of IGBT

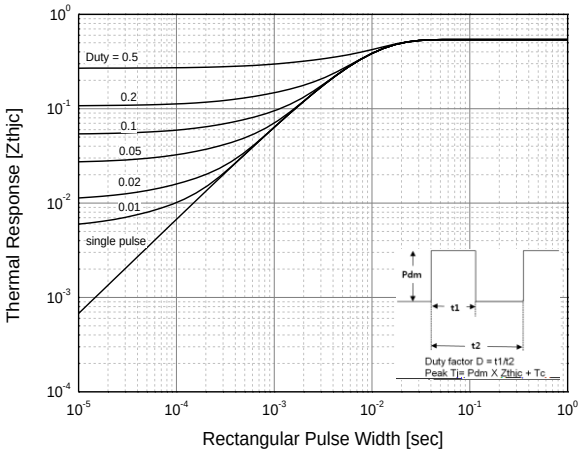
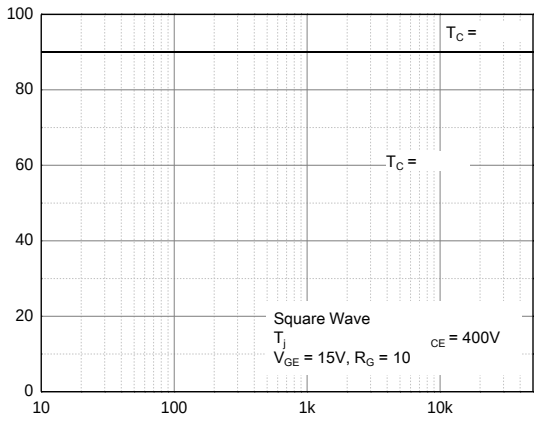


Fig. 17 Load Current vs. Frequency



Diode Characteristics

Fig. 18 Conduction characteristics

Fig. 19 Reverse recovery current vs. forward current

Fig. 20 Reverse recovery charge vs. forward current

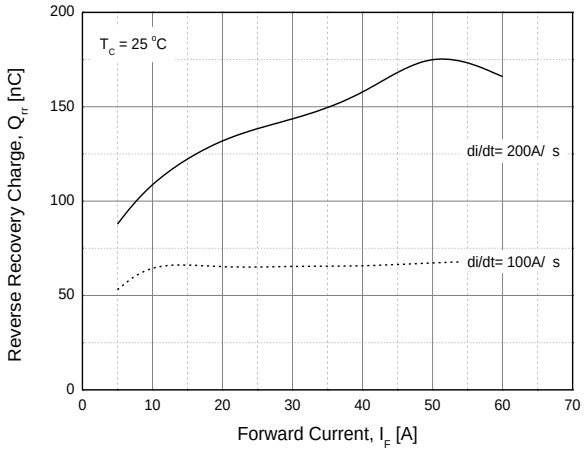
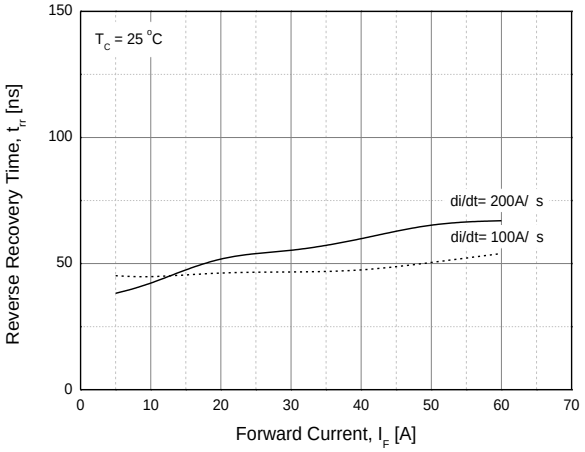
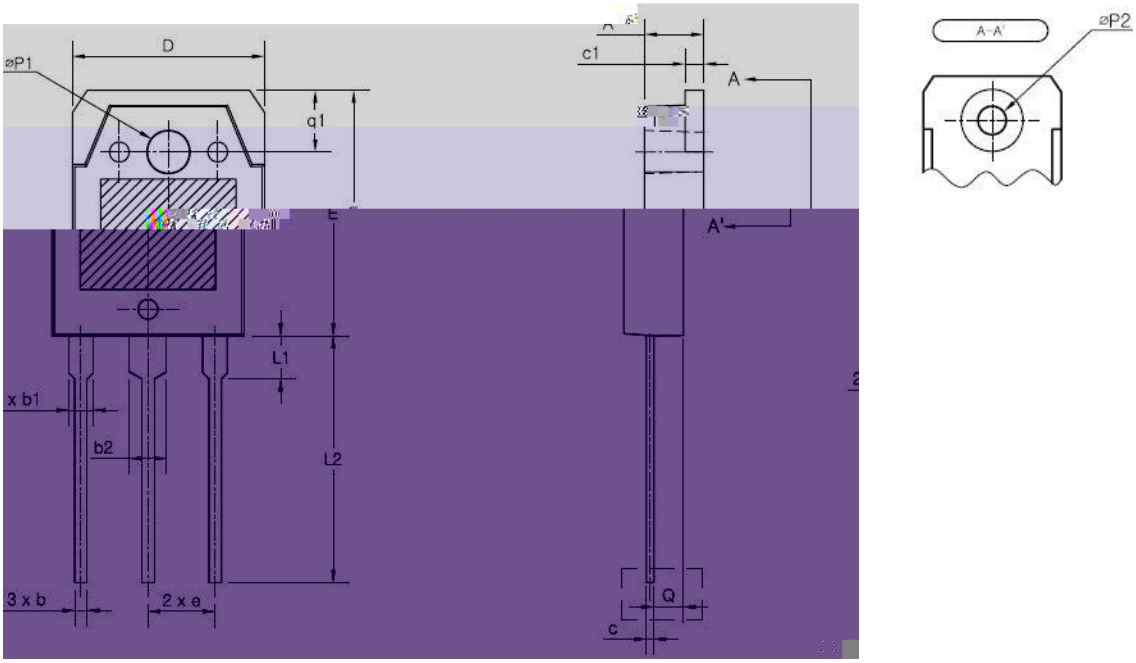


Fig. 21 Reverse recovery time vs. forward current



TO-3PN MECHANICAL DATA



SYMBOL	MIN	NOM	MAX
A	4.60	4.80	5.00
øP1	3.30	3.40	3.50

Disclaimer

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