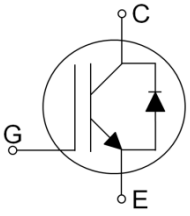
TGAN30N60FDRS
Field Stop Trench IGBT

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

TO-3PN



Applications
Motor Drive, Air Conditioner, Inverter, Solar

Device	Package	Marking	Remark
TGAN30N60FDRS	TO-3PN	TGAN30N60FDRS	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
Diode Pulsed Forward Current (Note 1)		I_{FM}	100	A
Power Dissipation	T_C = 25 ℃	P_D	120	W
	T_C = 100 ℃		60	W
Operating Junction Temperature		T_{vj}	-55 ~ 175	℃
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)	1.25	℃/W
Maximum Thermal resistance, Junction-to-Case	R_{JC} (DIODE)	2.35	℃/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	--	[illegible]	--	
ON						
Gate Emitter Threshold Voltage	V					

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 = 15A R_G = 5 , V_{GE} = 15V Inductive Load, T_{vj} = 175 ℃	--	13	--	ns
Rise Time	t_r		--	14	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	163	--	ns
Fall Time	t_f		--	102	--	ns
Turn-On Switching Loss	E_{ON}		--	0.52	--	mJ
Turn-Off Switching Loss	E_{OFF}		--	0.38	--	mJ
Total Switching Loss	E_{TS}		--	0.90	--	mJ
Turn-On Delay Time	$t_{d(on)}$	V_{CC} = 400V, I_C = 30A R_G = 5 , V_{GE} = 15V Inductive Load, T_{vj} = 175 ℃	--	15	--	ns
Rise Time	t_r		--	25	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	150	--	ns
Fall Time	t_f		--	49	--	ns
Turn-On Switching Loss	E_{ON}		--	1.13	1.70	mJ
Turn-Off Switching Loss	E_{OFF}		--	0.81	1.22	mJ
Total Switching Loss	E_{TS}		--	1.94	2.91	mJ
Short Circuit Withstanding Time	t_{SC}	V_{CC} = 300V, V_{GE} = 15V, T_{vj} = 125℃	5	--	--	s

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

IGBT Characteristics

Fig. 1 IGBT Output Characteristics

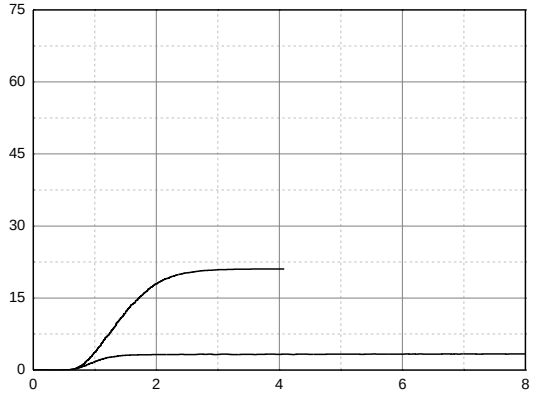


Fig. 2 IGBT Output Characteristics

Fig. 3 IGBT Saturation Voltage vs. Junction Temperature

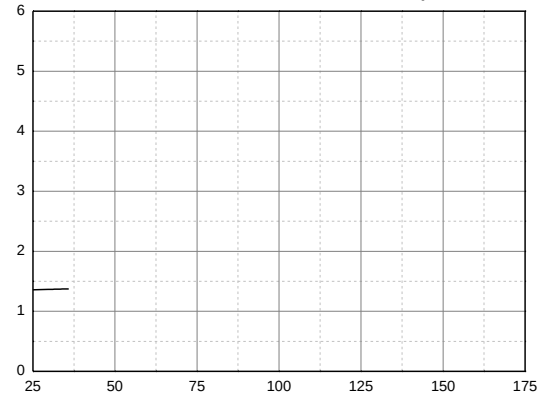


Fig. 4 IGBT Saturation Voltage vs. Gate Bias

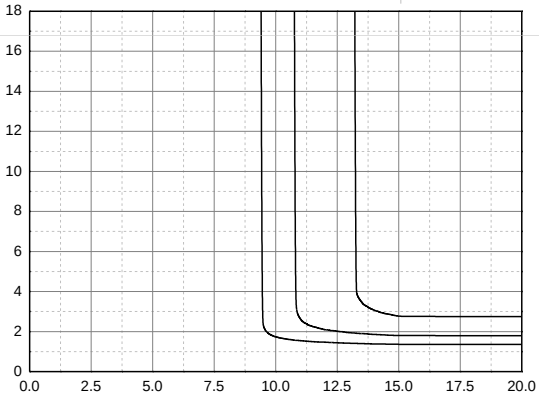


Fig. 5 IGBT Saturation Voltage vs. Gate Bias

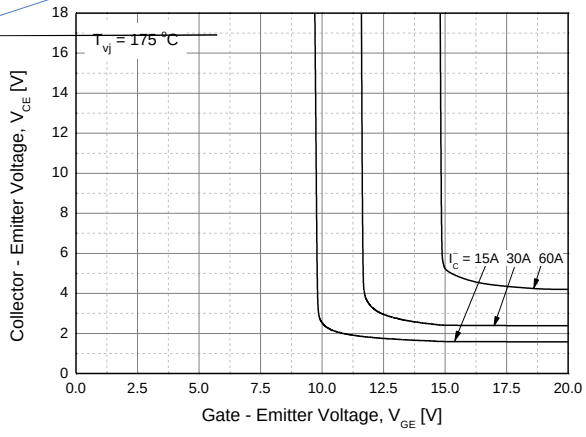


Fig. 6 IGBT Capacitance Characteristics

IGBT Characteristics

Fig. 7 Turn-on Time vs. Gate Resistor

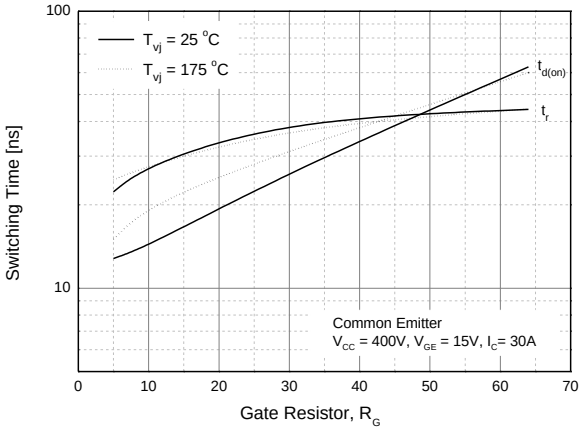


Fig. 8 Turn-off Time vs. Gate Resistor

Fig. 9 Switching Loss vs. Gate Resistor

Fig. 10 Turn-on Time vs. Collector Current

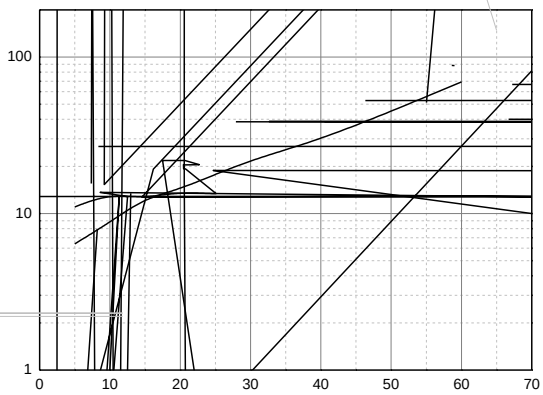


Fig. 11 Turn-off Time vs. Collector Current

Fig. 12 Switching Loss vs. Collector Current

IGBT Characteristics

Fig. 13 Gate Charge Characteristics

Fig. 14 SOA

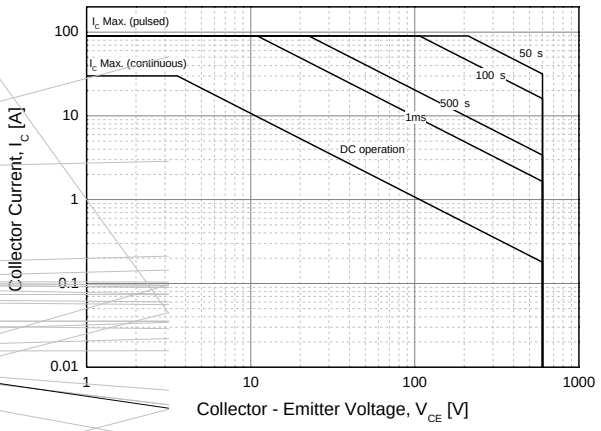


Fig. 15 RBSOA

Fig. 16 Transient Thermal Impedance of IGBT

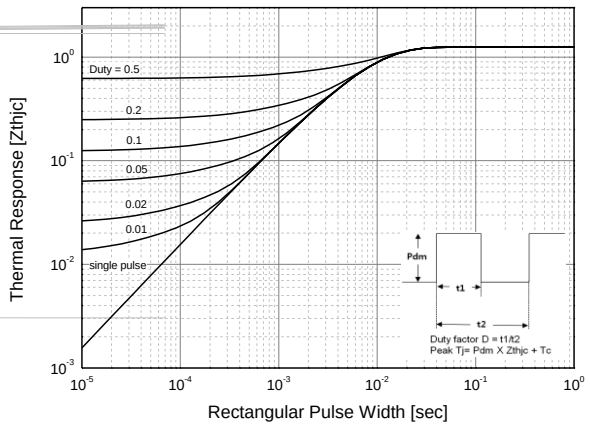
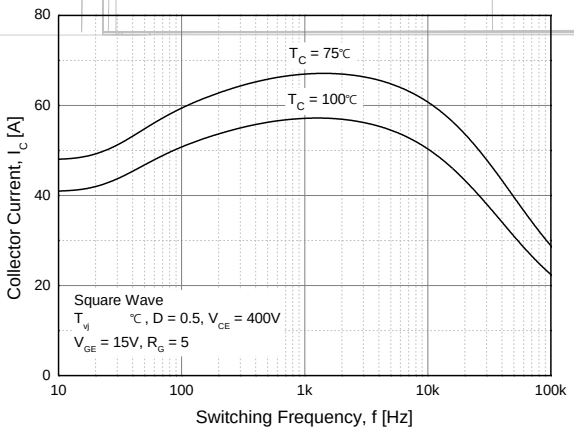


Fig. 17 Load Current vs. Frequency



DIODE Characteristics

Fig. 18 Diode Conduction Characteristics

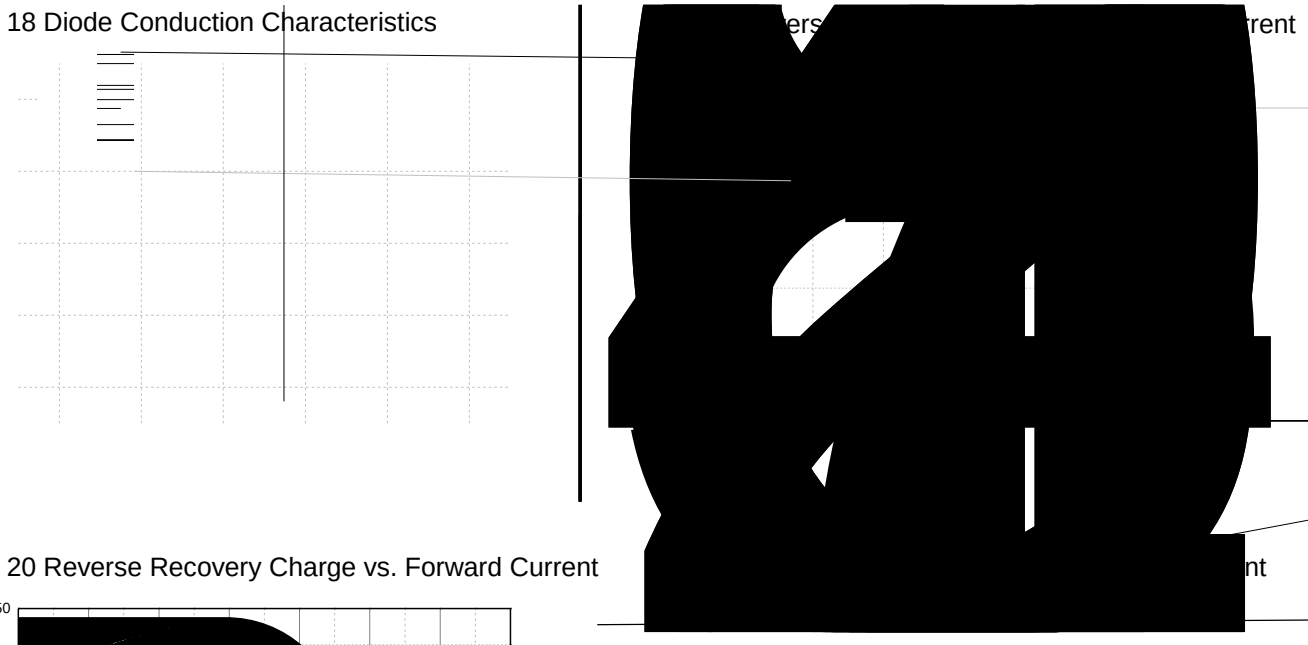
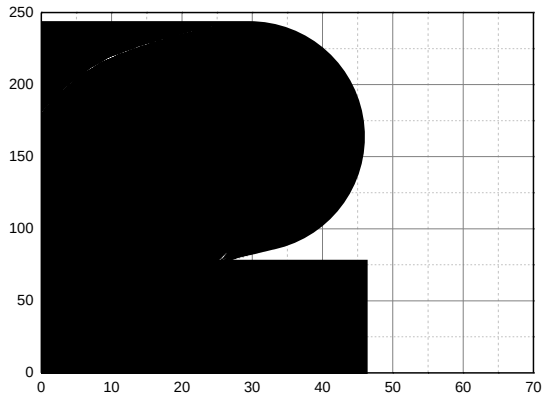
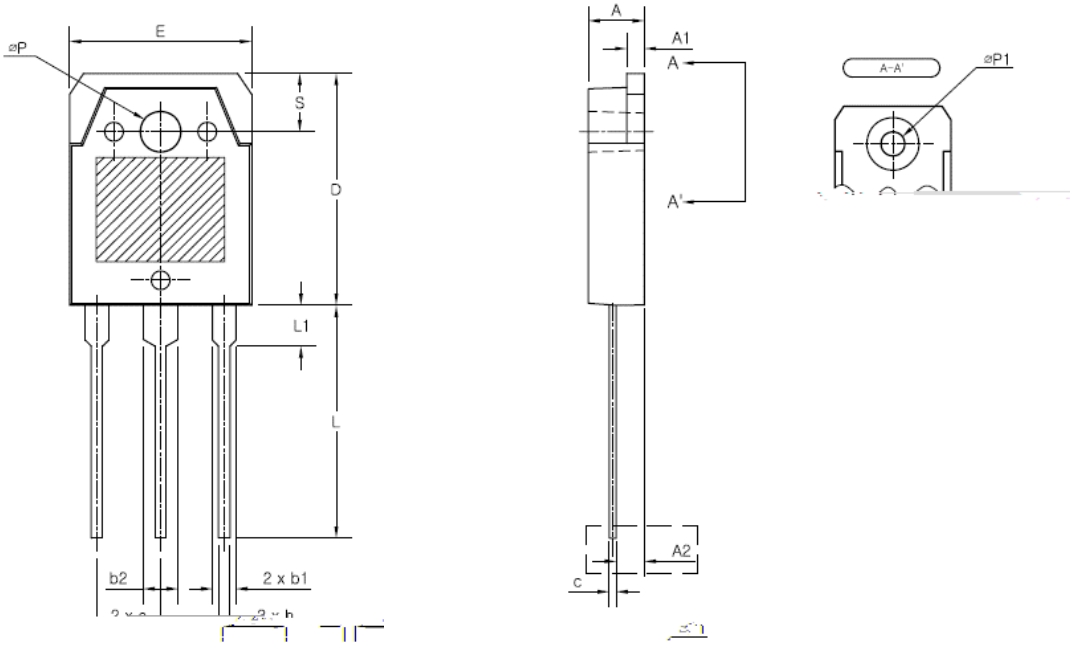


Fig. 20 Reverse Recovery Charge vs. Forward Current



TO-3PN MECHANICAL DATA



SYMBOL	mm		
	MIN	NOM	MAX
A	4.6	4.8	5
A1	1.45	1.5	1.65
A2	2.2	2.4	2.6
b	0.8	1	1.2
b1	2.8	3	3.2
b2	1.8	2	2.2
c	0.55	0.6	0.75
D	19.20	19.65	20.10
E	15.4	15.6	15.8
e	5.15	5.45	5.75
L	19.8	20	20.2
L1	3.3	3.5	3.7
P	3.5		
P1	3.2		
S	5		