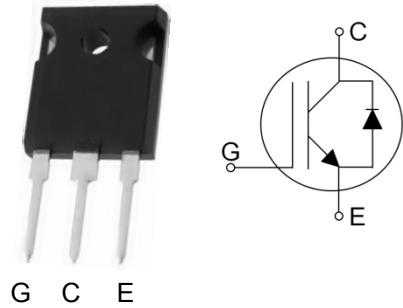


Features:

- 1200V Field Stop Trench Technology
- High Speed Switching
- Low Conduction Loss
- Positive Temperature Coefficient
- Easy parallel Operation
- RoHS compliant
- JEDEC Qualification

Applications :

Induction Heating, Soft switching application



Device	Package	Marking	Remark
TGH30N120FD	TO-247	TGH30N120FD	RoHS

Absolute Maximum Ratings

Parameter		Symbol	Value	Unit
Collector-Emitter Voltage		V_{CES}	1200	V
Gate-Emitter Voltage		V_{GES}	± 20	V
Continuous Collector Current	$T_C = 25\text{ }^{\circ}\text{C}$	I_C	60	A
	$T_C = 100\text{ }^{\circ}\text{C}$		30	A
Pulsed Collector Current (Note 1)		I_{CM}	90	A
Diode Continuous Forward Current	$T_C = 100\text{ }^{\circ}\text{C}$	I_F	30	A
Diode Maximum Forward Current		I_{FM}	90	A
Power Dissipation	$T_C = 25\text{ }^{\circ}\text{C}$	P_D	329	W
	$T_C = 100\text{ }^{\circ}\text{C}$		132	W
Operating Junction Temperature		T_J	-55 ~ 150	$^{\circ}\text{C}$
Storage Temperature Range		T_{STG}	-55 ~ 150	$^{\circ}\text{C}$
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		T_L	300	$^{\circ}\text{C}$

Notes :

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

Thermal Characteristics

Parameter	Symbol	Value	Unit
Maximum Thermal resistance, Junction-to-Case	$R_{\theta JC}$ (IGBT)	0.38	$^{\circ}\text{C/W}$
Maximum Thermal resistance, Junction-to-Case	$R_{\theta JC}$ (DIODE)	2.1	$^{\circ}\text{C/W}$
Maximum Thermal resistance, Junction-to-Ambient	$R_{\theta JA}$	40	$^{\circ}\text{C/W}$

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

Parameter	Symbol	Test condition	Min.	Typ.	Max.	Unit
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OFF

Collector – Emitter Breakdown Voltage	BV_{CES}	$V_{GE} = 0V, I_C = 1mA$	1200	--	--	V
Zero Gate Voltage Collector Current	I_{CES}	$V_{CE} = 1200V, V_{GE} = 0V$	--	--	1	mA
Gate – Emitter Leakage Current	I_{GES}	$V_{CE} = 0V, V_{GE} = \pm 20V$	--	--	± 250	nA

ON

Gate – Emitter Threshold Voltage	$V_{GE(TH)}$	$V_{GE} = V_{CE}, I_C = 30mA$	3.5	5.5	7.5	V
Collector – Emitter Saturation Voltage	$V_{CE(SAT)}$	$V_{GE} = 15V, I_C = 30A, T_C = 25^{\circ}\text{C}$	--	2.0	2.5	V
		$V_{GE} = 15V, I_C = 30A, T_C = 125^{\circ}\text{C}$	--	2.3	--	V

DYNAMIC

Input Capacitance	C_{IES}	$V_{CE} = 30V,$ $V_{GE} = 0V$ $f = 1MHz$	--	4000	--	pF
Output Capacitance	C_{OES}		--	105	--	pF
Reverse Transfer Capacitance	C_{RES}		--	72	--	pF

SWITCHING (Note 2)

Turn-On Delay Time	$t_{d(on)}$	$V_{CC} = 600V, I_C = 30A$ $R_G = 10\Omega, V_{GE} = 15V$ Inductive Load, $T_C = 25^{\circ}\text{C}$	--	40	--	ns
Rise Time	t_r		--	50	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	245	--	ns
Fall Time	t_f		--	70	150	ns
Turn-On Switching Loss	E_{ON}		--	4.5	6.75	mJ
Turn-Off Switching Loss	E_{OFF}		--	0.85	1.28	mJ
Total Switching Loss	E_{TS}		--	5.35	8.03	mJ
Turn-On Delay Time	$t_{d(on)}$	$V_{CC} = 600V, I_C = 30A$ $R_G = 10\Omega, V_{GE} = 15V$ Inductive Load, $T_C = 125^{\circ}\text{C}$	--	46	--	ns
Rise Time	t_r		--	48	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	256	--	ns
Fall Time	t_f		--	142	--	ns
Turn-On Switching Loss	E_{ON}		--	4.87	7.30	mJ
Turn-Off Switching Loss	E_{OFF}		--	1.82	2.73	mJ
Total Switching Loss	E_{TS}		--	6.67	10.03	mJ
Total Gate Charge	Q_g	$V_{CC} = 600V, I_C = 30A$ $V_{GE} = 15V$	--	220	330	nC
Gate-Emitter Charge	Q_{ge}		--	30	45	nC
Gate-Collector Charge	Q_{gc}		--	90	135	nC

Notes :

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

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

Parameter	Symbol	Test condition		Min.	Typ.	Max.	Unit
Diode Forward Voltage	V _{FM}	I _F = 30A	T _C = 25 °C	--	2.25	2.75	V
			T _C = 125 °C	--	2.53	--	
Reverse Recovery Time	t _{rr}	I _F = 30A, di/dt = 200A/μs	T _C = 25 °C	--	300	450	ns
			T _C = 125 °C	--	360	--	
Reverse Recovery Current	I _{rr}		T _C = 25 °C	--	30	45	A
			T _C = 125 °C	--	34	--	
Reverse Recovery Charge	Q _{rr}		T _C = 25 °C	--	4400	--	nC
			T _C = 125 °C	--	6120	--	

IGBT Characteristics

Fig. 1 Output characteristics

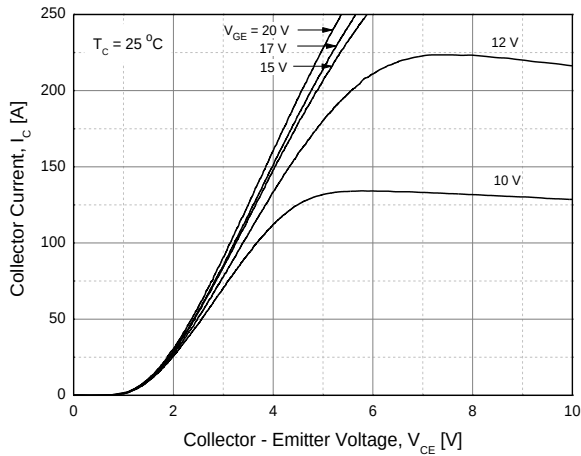


Fig. 2 Saturation voltage characteristics

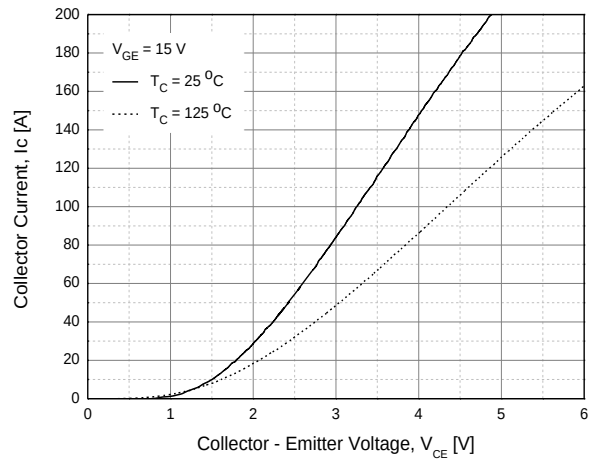


Fig. 3 Saturation voltage vs. collector current

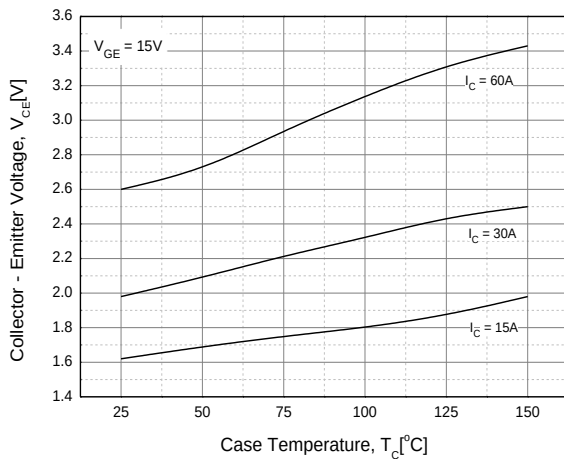


Fig. 4 Saturation voltage vs. gate bias

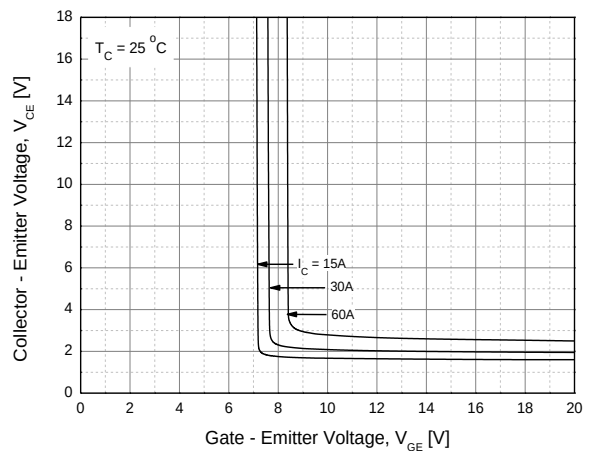


Fig. 5 Saturation voltage vs. gate bias

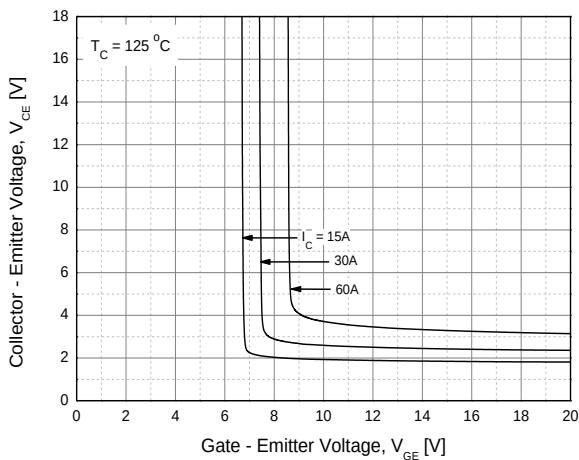
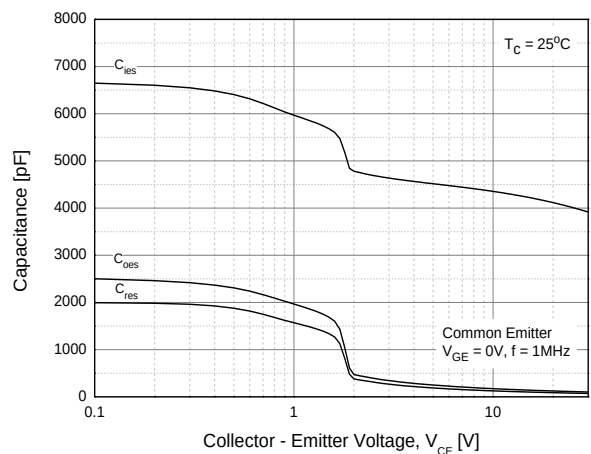


Fig. 6 Capacitance characteristics



IGBT Characteristics

Fig. 7 Turn-on time vs. gate resistor

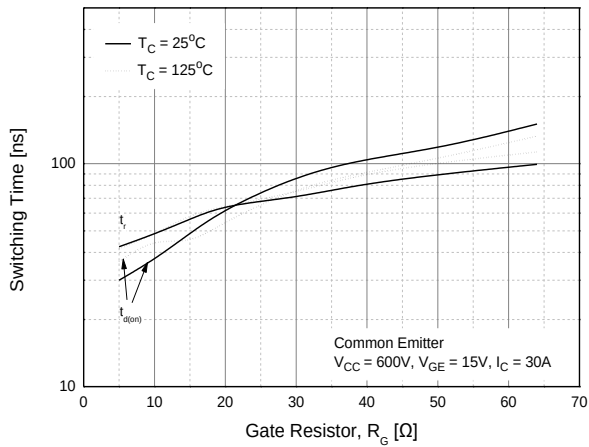


Fig. 8 Turn-off time vs. gate resistor

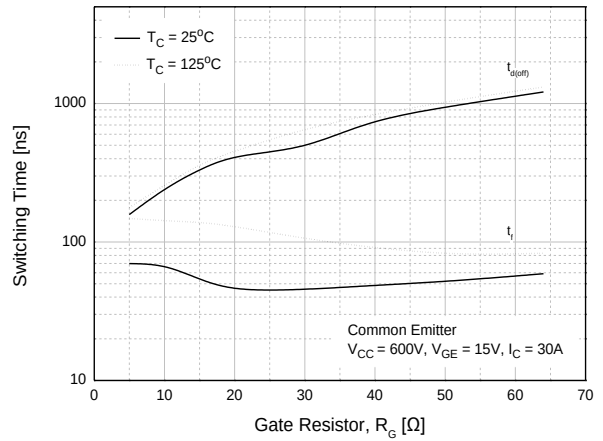


Fig. 9 Switching loss vs. gate resistor

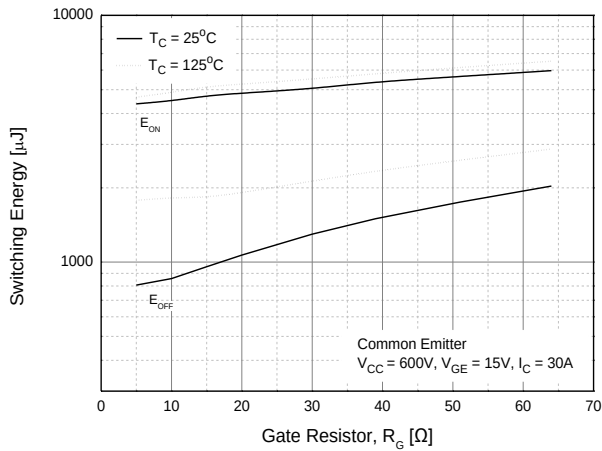


Fig. 10 Turn-on time vs. collector current

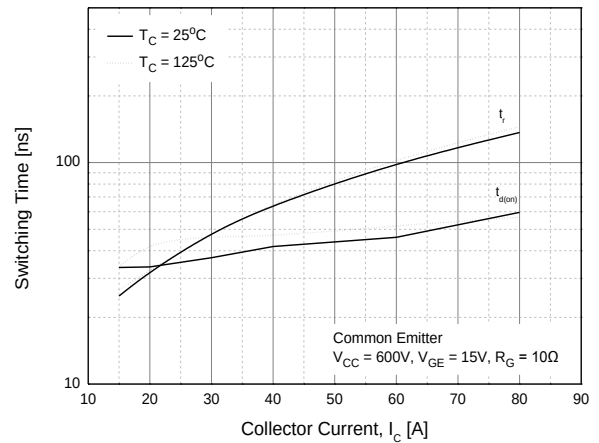


Fig. 11 Turn-off time vs. collector current

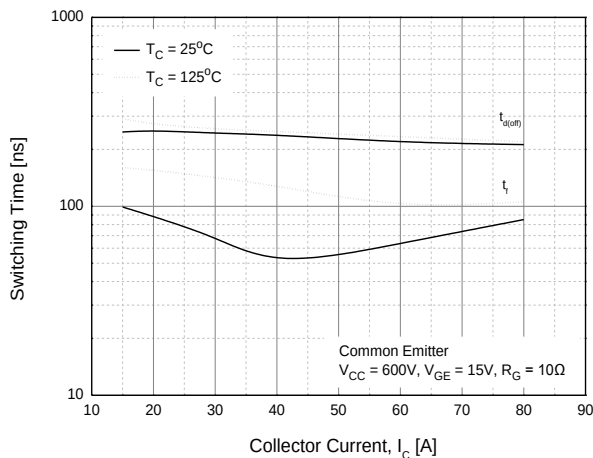
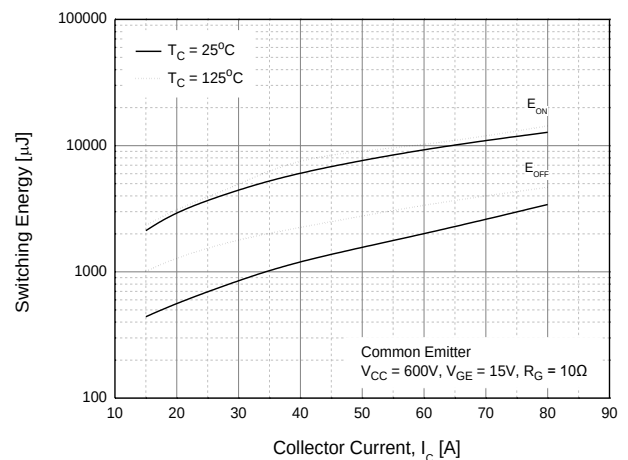


Fig. 12 Switching loss vs. collector current



IGBT Characteristics

Fig. 13 Gate charge characteristics

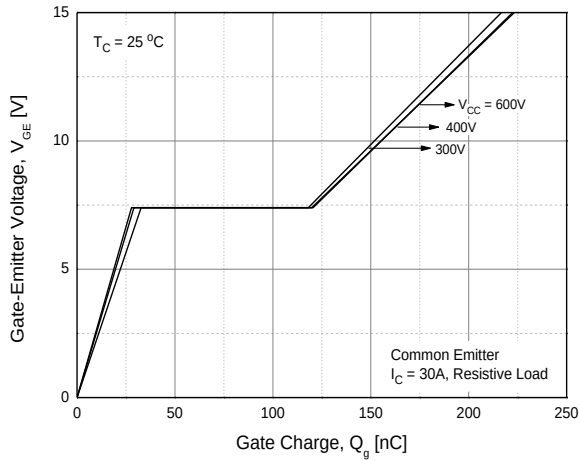


Fig. 14 SOA

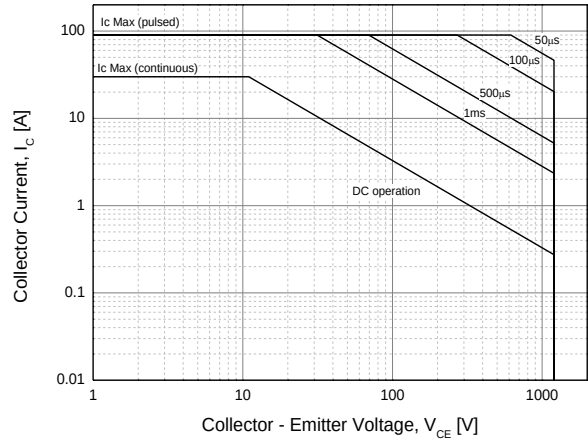


Fig. 15 RBSOA

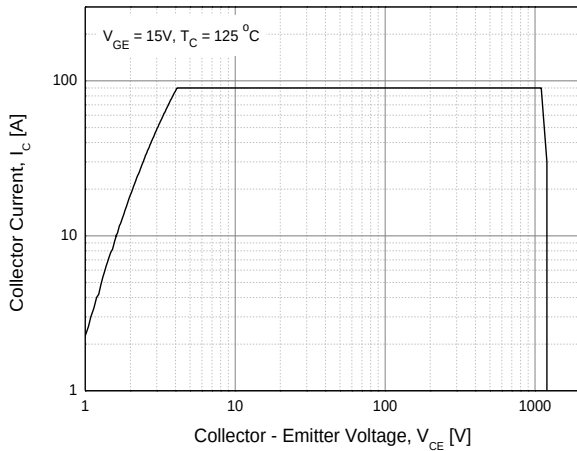


Fig. 16 Transient thermal impedance of IGBT

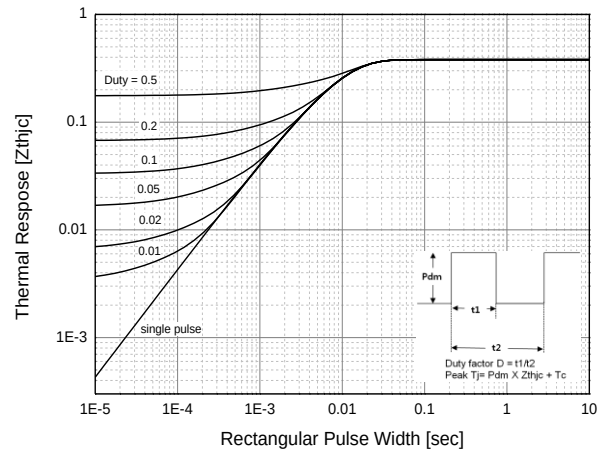
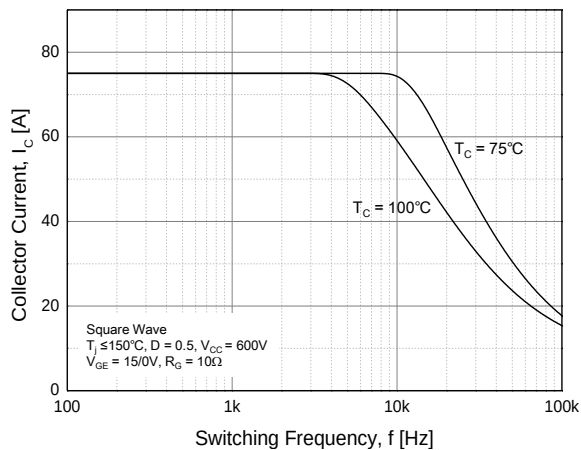


Fig. 17 Load Current vs. Frequency



Diode Characteristics

Fig. 18 Conduction characteristics

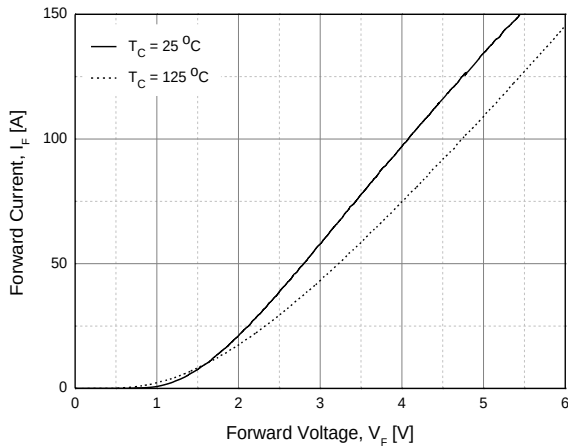


Fig. 19 Reverse recovery current vs. forward current

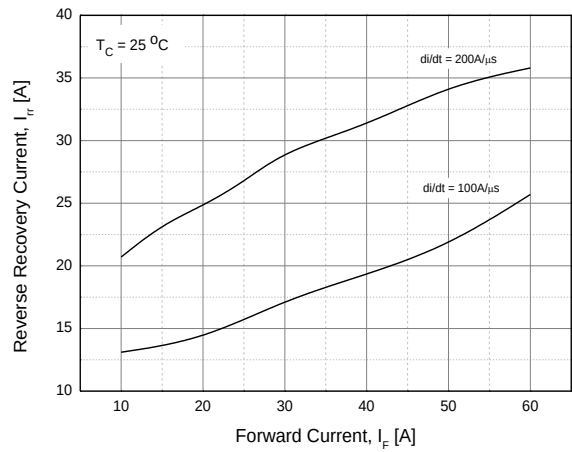


Fig. 20 Reverse recovery charge vs. forward current

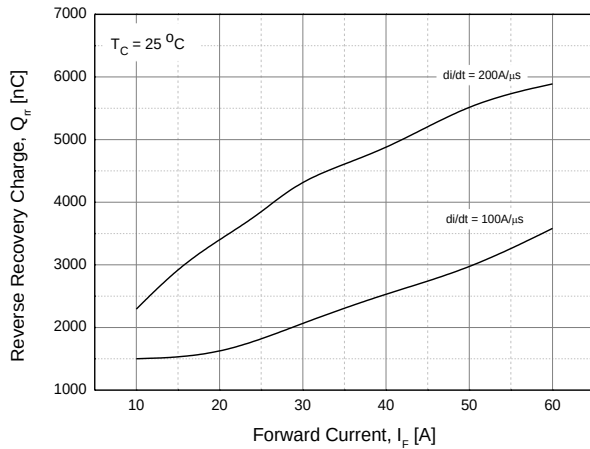
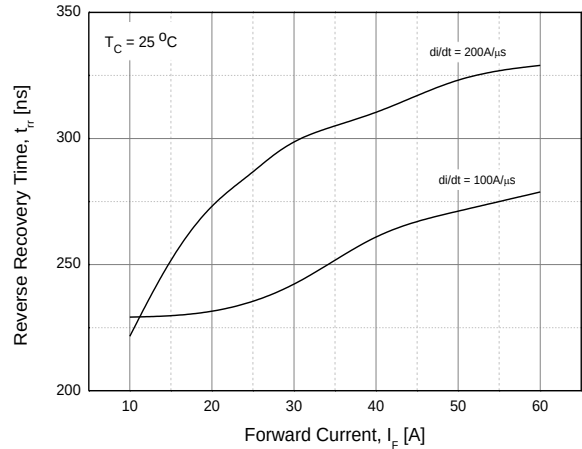
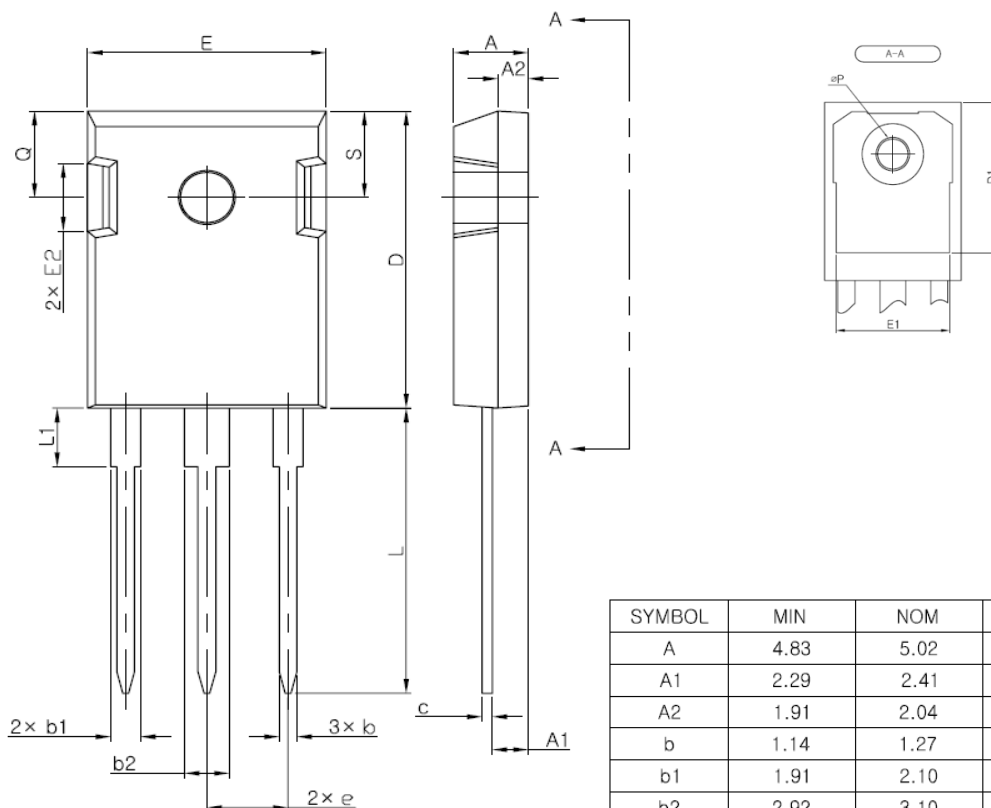


Fig. 21 Reverse recovery time vs. forward current



TO-247 MECHANICAL DATA


SYMBOL	MIN	NOM	MAX
A	4.83	5.02	5.21
A1	2.29	2.41	2.54
A2	1.91	2.04	2.16
b	1.14	1.27	1.40
b1	1.91	2.10	2.20
b2	2.92	3.10	3.20
c	0.61	0.71	0.80
D	20.80	21.07	21.34
D1	17.43	17.63	17.83
E	15.75	15.94	16.13
E1	13.06	13.26	13.46
E2	4.32	4.58	4.83
e	5.45 BSC		
L	19.81	20.19	20.57
L1	3.81	4.07	4.32
øP	3.55	3.60	3.65
Q	5.59	5.90	6.20
S	6.15 BSC		

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