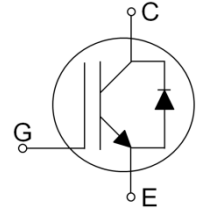


Features:

- 1000V NPT 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
TGL60N100ND1	TO-264	TGL60N100ND1	RoHS

Absolute Maximum Ratings

Parameter		Symbol	Value	Unit
Collector-Emitter Voltage		V_{CES}	1000	V
Gate-Emitter Voltage		V_{GES}	± 20	V
Continuous Current	$T_C = 25\text{ }^{\circ}\text{C}$	I_c	60	A
	$T_C = 100\text{ }^{\circ}\text{C}$		42	A
Pulsed Collector Current (Note 1)		I_{CM}	120	A
Diode Continuous Forward Current	$T_C = 100\text{ }^{\circ}\text{C}$	I_F	15	A
Power Dissipation	$T_C = 25\text{ }^{\circ}\text{C}$	P_D	463	W
	$T_C = 100\text{ }^{\circ}\text{C}$		185	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 max junction temperature

Thermal Characteristics

Parameter	Symbol	Value	Unit
Maximum Thermal resistance, Junction-to-Case	$R_{\theta JC}$ (IGBT)	0.27	$^{\circ}\text{C/W}$
Maximum Thermal resistance, Junction-to-Case	$R_{\theta JC}$ (DIODE)	1.59	$^{\circ}\text{C/W}$
Maximum Thermal resistance, Junction-to-Ambient	$R_{\theta JA}$	25	$^{\circ}\text{C/W}$

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

Parameter	Symbol	Test condition	Min	Typ	Max	Units
OFF						
Collector – Emitter Breakdown Voltage	BV_{CES}	$V_{GE} = 0V, I_C = 1mA$	1000	--	--	V
Zero Gate Voltage Collector Current	I_{CES}	$V_{CE} = 1000V, V_{GE} = 0V$	--	--	1	mA
Gate – Emitter Leakage Current	I_{GES}	$V_{CE} = 0V, V_{GE} = 20V$	--	--	± 250	nA

ON

Gate – Emitter Threshold Voltage	$V_{GE(TH)}$	$V_{GE} = V_{CE}, I_C = 60mA$	3.5	5.5	7.5	V
Collector – Emitter Saturation Voltage	$V_{CE(SAT)}$	$V_{GE} = 15V, I_C = 60A, T_J = 25^{\circ}\text{C}$	--	2.3	2.9	V
		$V_{GE} = 15V, I_C = 60A, T_J = 125^{\circ}\text{C}$	--	2.8	--	V

DYNAMIC

Input Capacitance	C_{IES}	$V_{CE} = 30V,$ $V_{GE} = 0V$ $f = 1MHz$	--	5600	--	pF
Output Capacitance	C_{OES}		--	150	--	pF
Reverse Transfer Capacitance	C_{RES}		--	115	--	pF

SWITCHING

Turn-On Delay Time	$t_{d(on)}$	$V_{CC} = 600V, I_C = 60A$ $R_G = 50\Omega, V_{GE} = 15V$ Inductive Load, $T_J = 25^{\circ}\text{C}$	--	230	--	ns
Rise Time	t_r		--	210	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	1480	--	ns
Fall Time	t_f		--	125	230	ns
Turn-On Switching Loss	E_{ON}		--	13.1	20	mJ
Turn-Off Switching Loss	E_{OFF}		--	6.3	10	mJ
Total Switching Loss	E_{TS}		--	19.4	30	mJ
Turn-On Delay Time	$t_{d(on)}$	$V_{CC} = 600V, I_C = 60A$ $R_G = 50\Omega, V_{GE} = 15V$ Inductive Load, $T_J = 125^{\circ}\text{C}$	--	200	--	ns
Rise Time	t_r		--	200	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	1670	--	ns
Fall Time	t_f		--	160	--	ns
Turn-On Switching Loss	E_{ON}		--	13.3	20	mJ
Turn-Off Switching Loss	E_{OFF}		--	7.6	11.4	mJ
Total Switching Loss	E_{TS}		--	20.9	31.4	mJ
Total Gate Charge	Q_g	$V_{CC} = 600V, I_C = 60A$ $V_{GE} = 15V$	--	270	405	nC
Gate-Emitter Charge	Q_{ge}		--	45	68	nC
Gate-Collector Charge	Q_{gc}		--	100	150	nC

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

Parameter	Symbol	Test condition		Min	Typ	Max	Units
Diode Forward Voltage	V _{FM}	I _F = 15 A	T _J =25 °C	--	1.7	2.2	V
			T _J =125 °C	--	1.8	--	
Diode Forward Voltage	V _{FM}	I _F = 60 A	T _J =25 °C	--	2.9	3.4	V
			T _J =125 °C	--	3.3	--	
Reverse Recovery Time	t _{rr}	I _F = 60 A, dI/dt=200A/us	T _J =25 °C	--	310	465	ns
			T _J =125 °C	--	320	--	
Reverse Recovery Current	I _{rr}		T _J =25 °C	--	34	51	A
			T _J =125 °C	--	35	--	
Reverse Recovery Charge	Q _{rr}		T _J =25 °C	--	5270	7900	nC
			T _J =125 °C	--	5600	--	

IGBT Characteristics

Fig. 1 Output characteristics

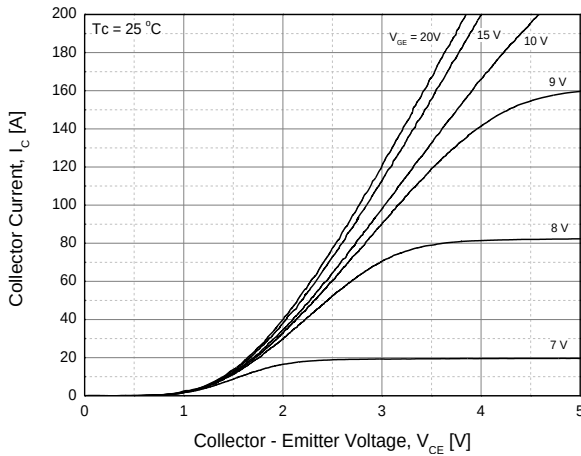


Fig. 2 Saturation voltage characteristics

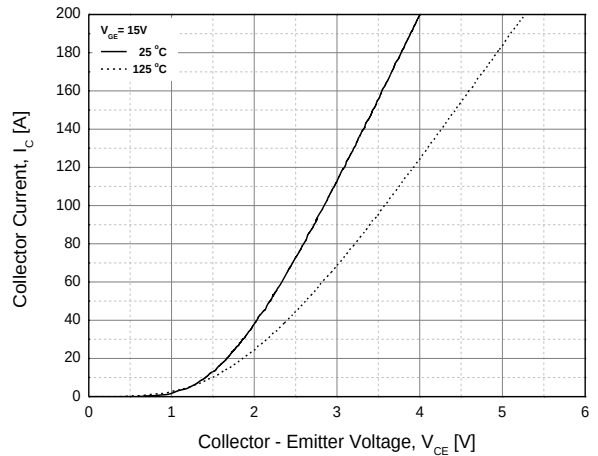


Fig. 3 Saturation voltage vs. collector current

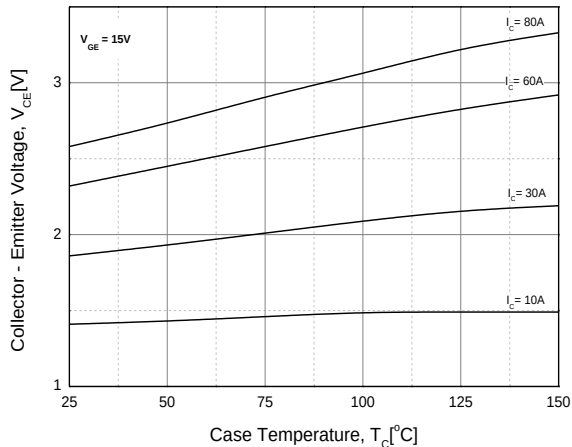


Fig. 4 Saturation voltage vs. gate bias

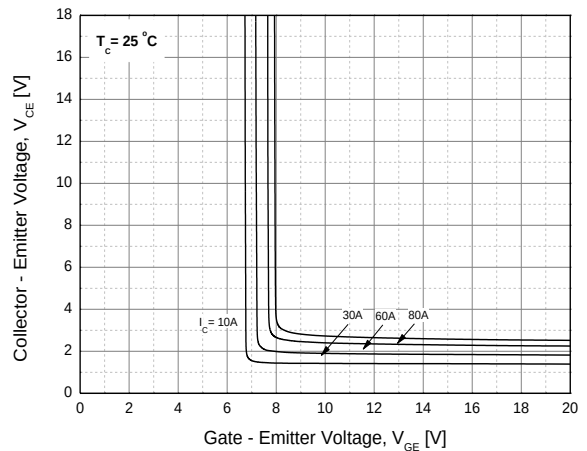


Fig. 5 Saturation voltage vs. gate bias

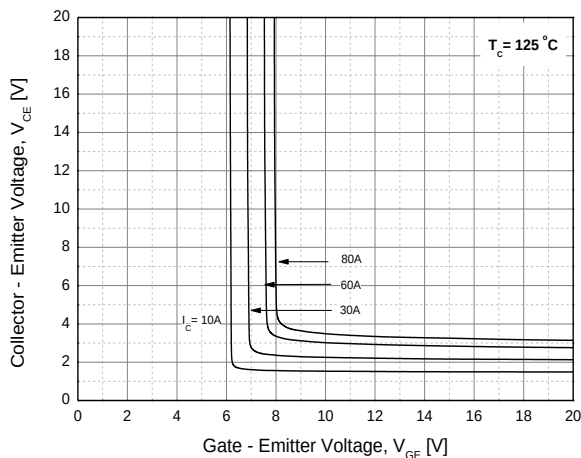
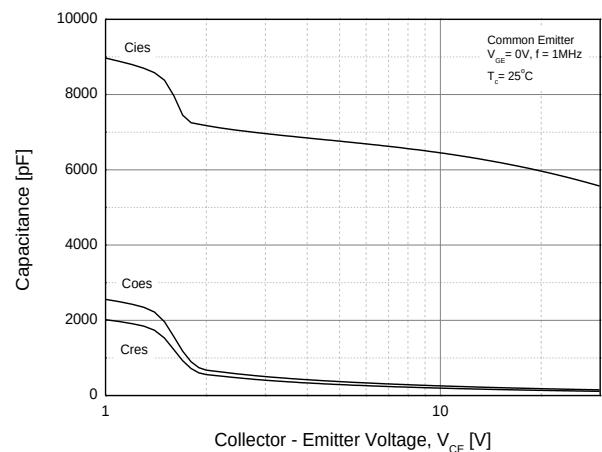


Fig. 6 Capacitance characteristics



IGBT Characteristics

Fig. 7 Turn on time vs. gate resistance

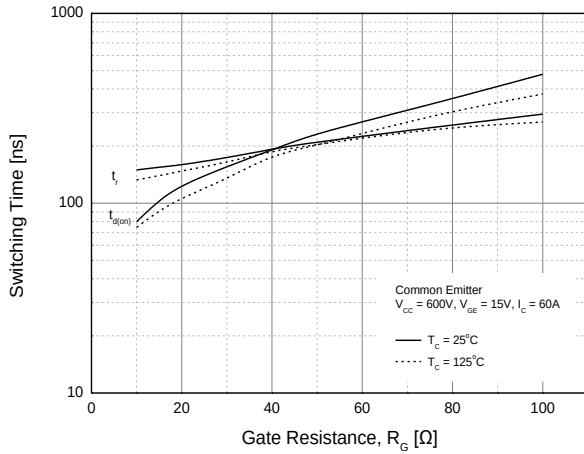


Fig. 8 Turn off time vs. gate resistance

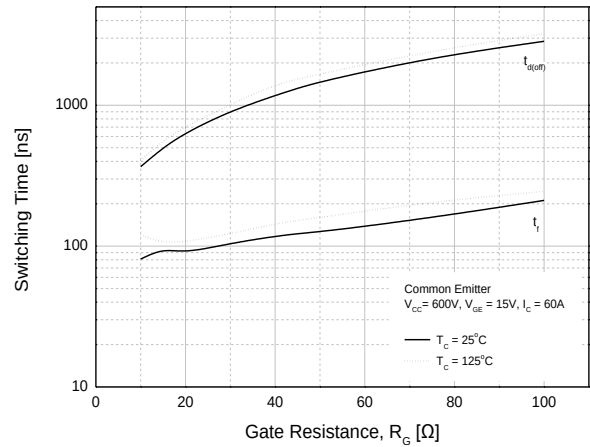


Fig. 9 Switching loss vs. gate resistance

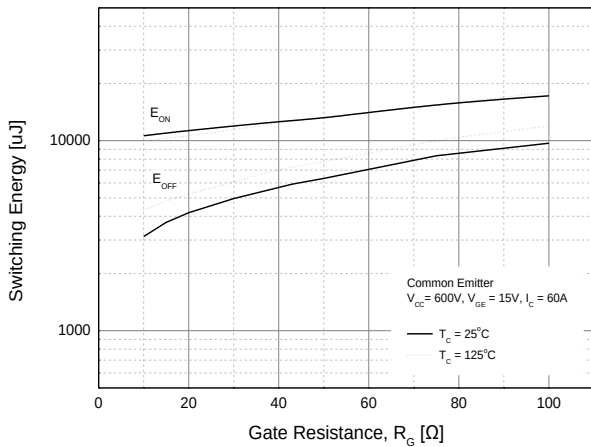


Fig. 10 Turn on time vs. collector current

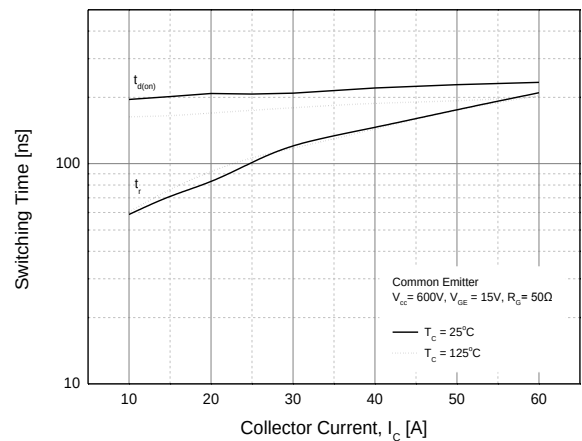


Fig. 11 Turn off time vs. collector current

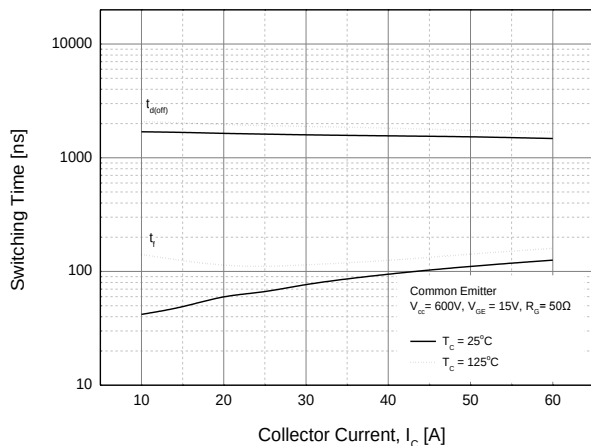
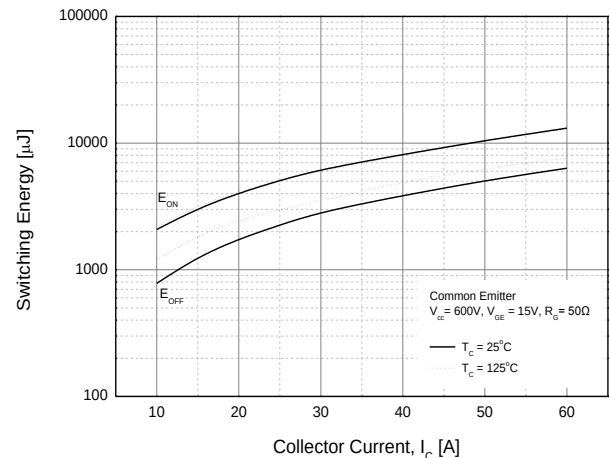


Fig. 12 Switching loss vs. collector current



IGBT Characteristics

Fig. 13 Gate charge characteristics

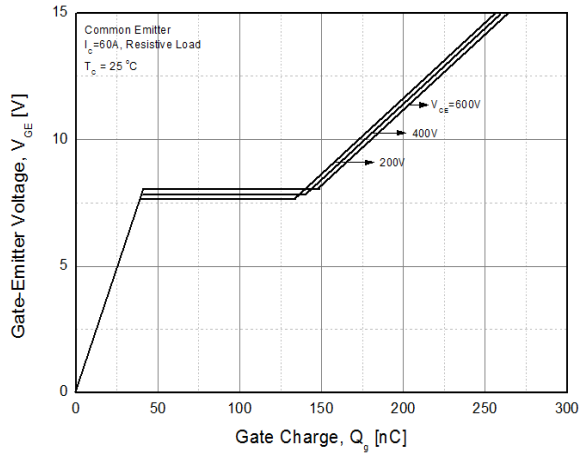


Fig. 14 SOA

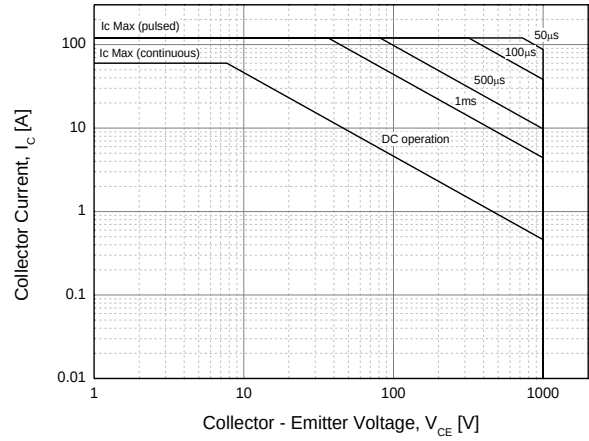


Fig. 15 RBSOA

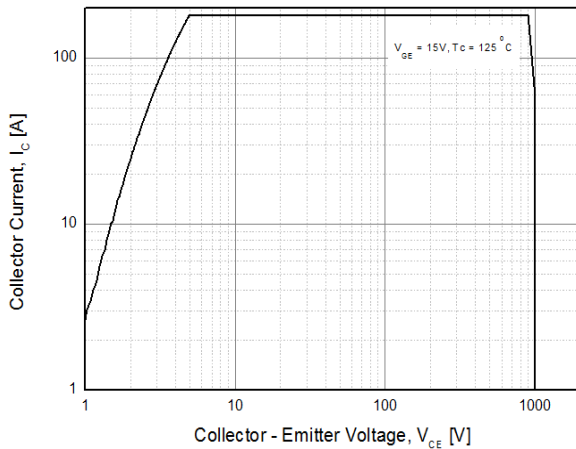


Fig. 16 Transient thermal impedance

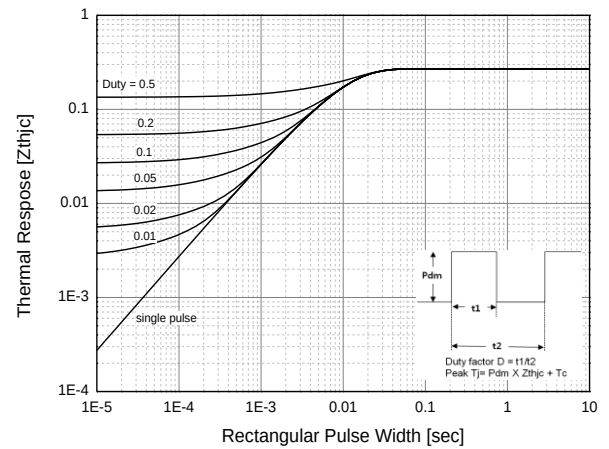
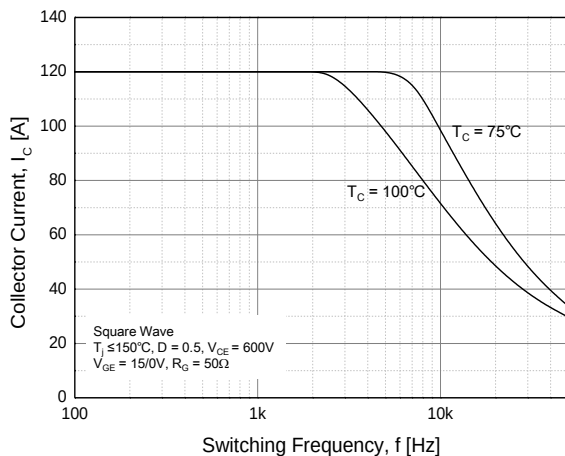


Fig. 17 Load Current vs. Frequency



Diode Characteristics

Fig. 18 Conduction characteristics

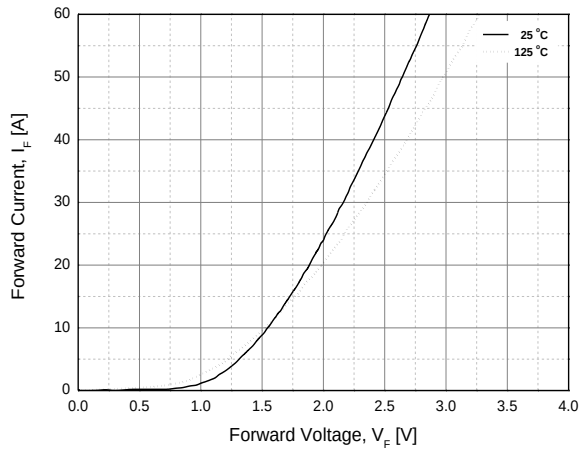


Fig. 19 Reverse recovery current vs. forward current

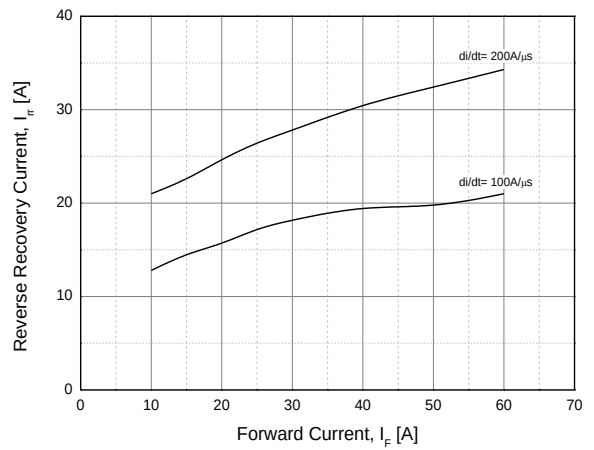


Fig. 20 Stored recovery charge vs. forward current

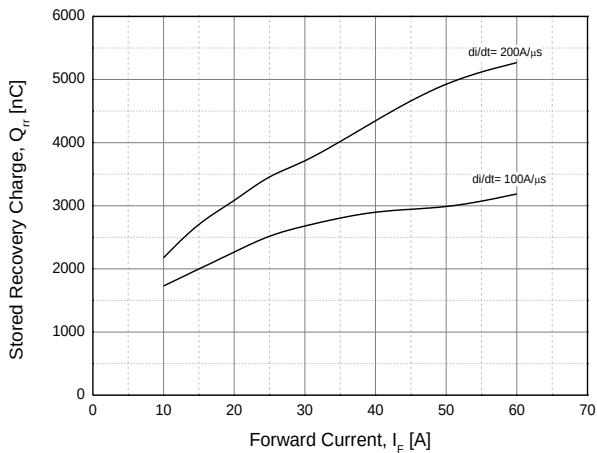
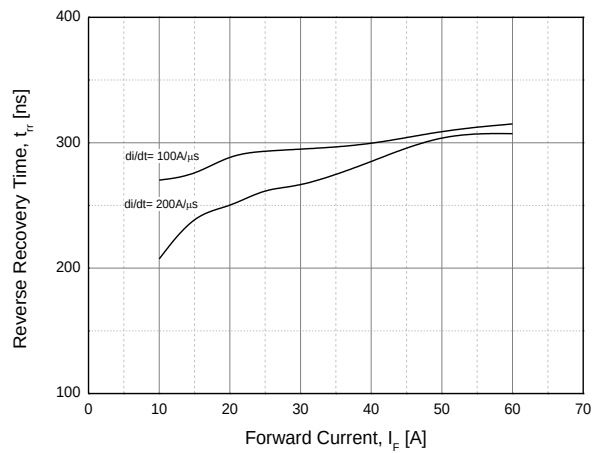
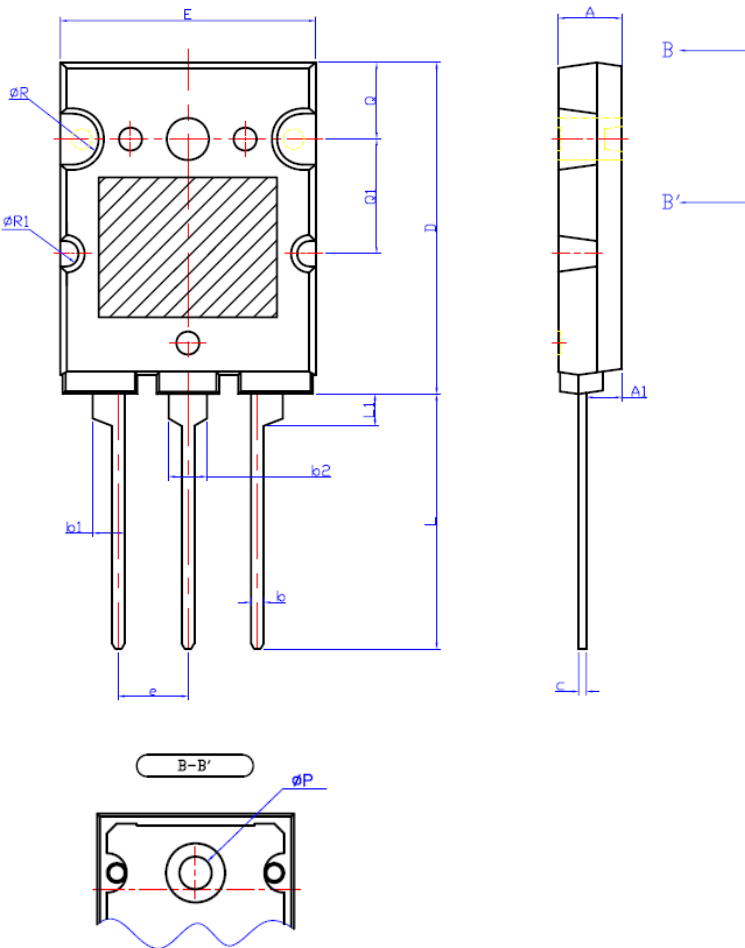


Fig. 21 Reverse recovery time vs. forward current



Package Dimension : TO-264



SYMBOL	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.50	2.80	3.10
b	0.90	1.00	1.25
b1	2.30	2.50	2.70
b2	2.80	3.00	3.20
c	0.50	0.60	0.85
D	25.80	26.00	26.20
E	19.80	20.00	20.20
e	5.15	5.45	5.75
L	19.50	20.00	20.50
L1	2.40	2.50	2.60
ϕP	3.00	3.20	3.40
Q	5.80	6.00	6.20
Q1	8.80	9.00	9.20
ϕR	(2.00)		
$\phi R1$	(1.00)		