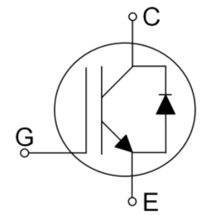
GlobalPower SIDiscrete

GPA015A120MN-ND
NPT Trench IGBT

Features:
- 1200V 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
GPA015A120MN-ND	TO-3PN	GPA015A120MN-ND	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 ℃	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 Maximum Forward Current		I_{FM}	45	A
Power Dissipation	T_C = 25 ℃	P_D	212	W
	T_C = 100 ℃		85	W
Operating Junction Temperature		T_J	-55 ~ 150	℃
Storage Temperature Range		T_{STG}	-55 ~ 150	℃
Maximum lead temperature for soldering purposes, 1/8” from case for 5 seconds		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	$R_{\theta JC}$ (IGBT)	0.59	℃/W
Maximum Thermal resistance, Junction-to-Case	$R_{\theta JC}$ (DIODE)	3	℃/W
Maximum Thermal resistance, Junction-to-Ambient	$R_{\theta JA}$	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	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} = ± 20V	--	--	± 250	nA
ON						
Gate – Emitter Threshold Voltage	$V_{GE(TH)}$	V_{GE} = V_{CE}, I_C = 15mA	3.0	5.0	7.0	V
Collector – Emitter Saturation Voltage	$V_{CE(SAT)}$	V_{GE} = 15V, I_C = 15A, T_C = 25 °C	--	1.9	2.5	V
		V_{GE} = 15V, I_C = 15A, T_C = 125 °C	--	2.2	--	V
DYNAMIC						
Input Capacitance	C_{IES}	V_{CE} = 30V, V_{GE} = 0V f = 1MHz	--	2640	--	pF
Output Capacitance	C_{OES}		--	60	--	pF
Reverse Transfer Capacitance	C_{RES}		--	40	--	pF
SWITCHING (Note 2)						
Turn-On Delay Time	$t_{d(on)}$	V_{CC} = 600V, I_C = 15A R_G = 10Ω, V_{GE} = 15V Inductive Load, T_C = 25 °C	--	25	--	ns
Rise Time	t_r		--	22	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	166	--	ns
Fall Time	t_f		--	103	155	ns
Turn-On Switching Loss	E_{ON}		--	1.61	2.42	mJ
Turn-Off Switching Loss	E_{OFF}		--	0.53	0.8	mJ
Total Switching Loss	E_{TS}		--	2.14	3.22	mJ
Turn-On Delay Time	$t_{d(on)}$	V_{CC} = 600V, I_C = 15A R_G = 10Ω, V_{GE} = 15V Inductive Load, T_C = 125 °C	--	21	--	ns
Rise Time	t_r		--	22	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	187	--	ns
Fall Time	t_f		--	195	--	ns
Turn-On Switching Loss	E_{ON}		--	1.76	2.64	mJ
Turn-Off Switching Loss	E_{OFF}		--	1.02	1.53	mJ
Total Switching Loss	E_{TS}		--	2.78	4.17	mJ
Total Gate Charge	Q_g	V_{CC} = 600V, I_C = 15A V_{GE} = 15V	--	140	210	nC
Gate-Emitter Charge	Q_{ge}		--	15	22	nC
Gate-Collector Charge	Q_{gc}		--	60	90	nC

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

Electrical Characteristics of the DIODE T_C=25℃, unless otherwise noted

Parameter	Symbol	Test condition		Min.	Typ.	Max.	Unit
Diode Forward Voltage	V_{FM}	I_F = 15A	T_C = 25 °C	--	2.0	2.5	V
			T_C = 125 °C	--	2.2	--	
Reverse Recovery Time	t_{rr}	I_F = 15A, di/dt = 200A/μs	T_C = 25 °C	--	200	320	ns
			T_C = 125 °C	--	270	--	
Reverse Recovery Current	I_{rr}		T_C = 25 °C	--	22	35	A
			T_C = 125 °C	--	28	--	
Reverse Recovery Charge	Q_{rr}		T_C = 25 °C	--	2230	--	nC
			T_C = 125 °C	--	3750	--	

IGBT Characteristics

Fig. 1 Output characteristics

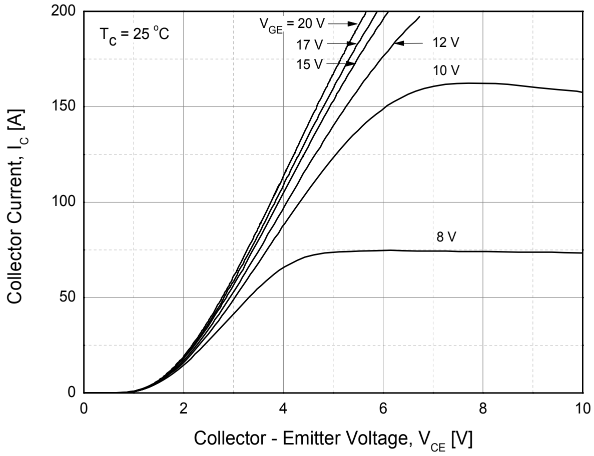


Fig. 2 Saturation voltage characteristics

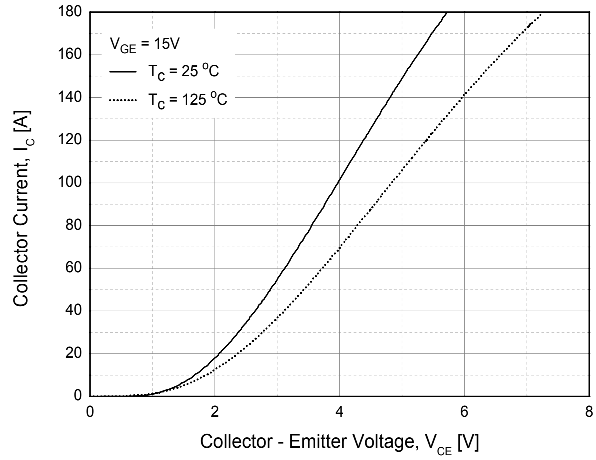


Fig. 3 Saturation voltage vs. collector current

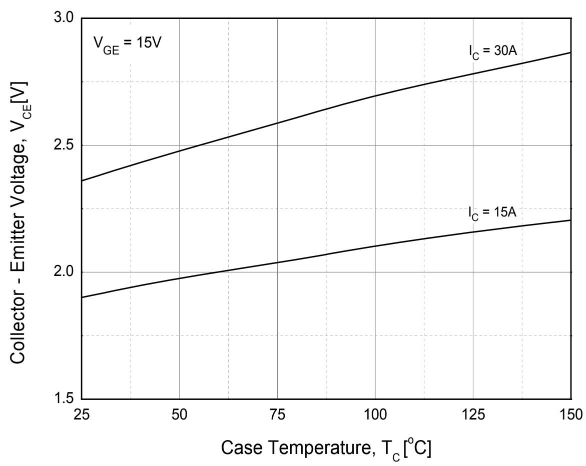


Fig. 4 Saturation voltage vs. gate bias

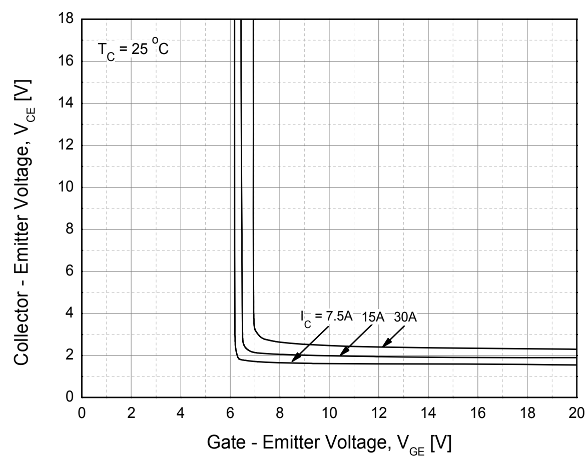


Fig. 5 Saturation voltage vs. gate bias

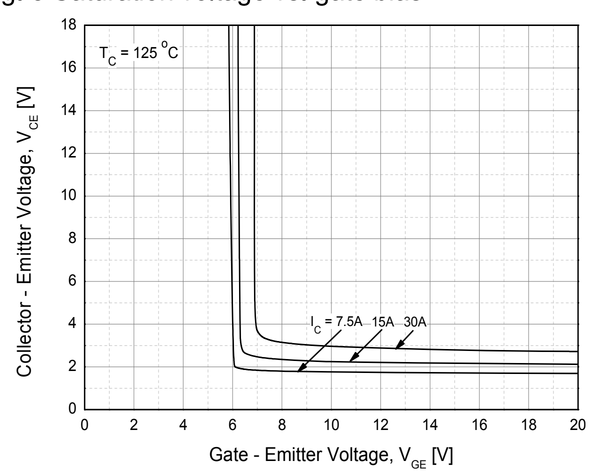
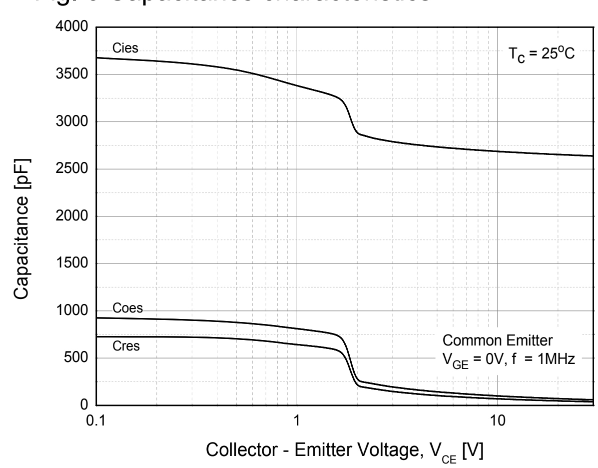


Fig. 6 Capacitance characteristics



IGBT Characteristics

Fig. 7 Turn-on time vs. gate resistor

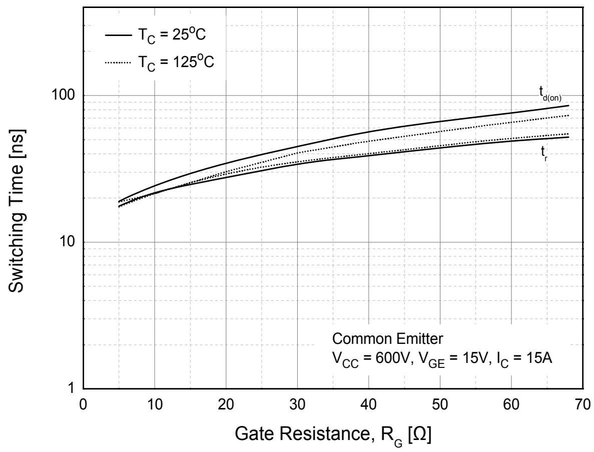


Fig. 8 Turn-off time vs. gate resistor

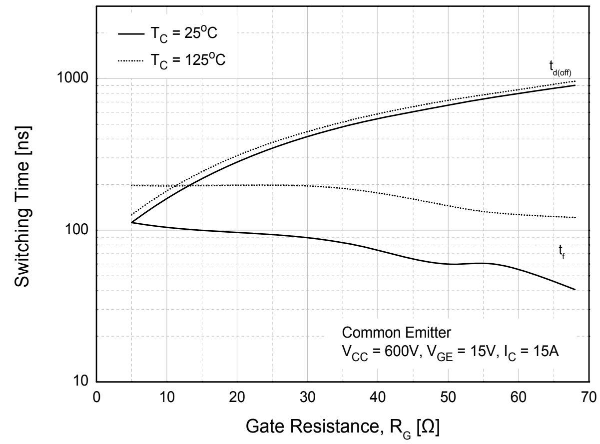


Fig. 9 Switching loss vs. gate resistor

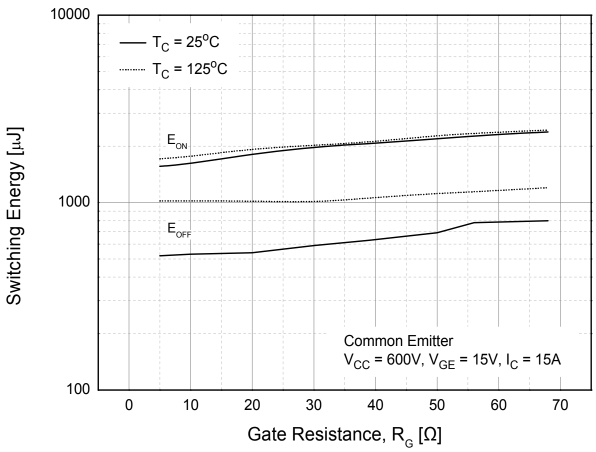


Fig. 10 Turn-on time vs. collector current

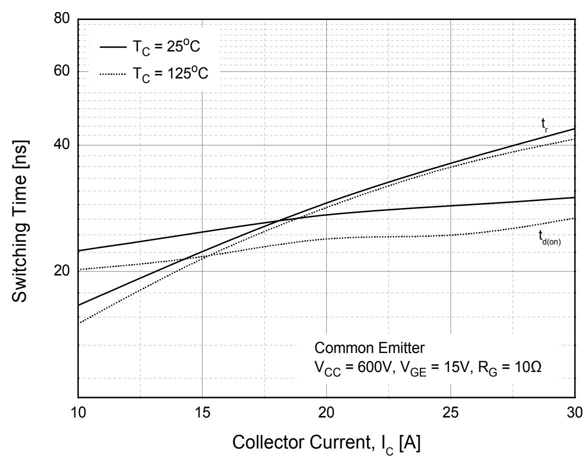


Fig. 11 Turn-off time vs. collector current

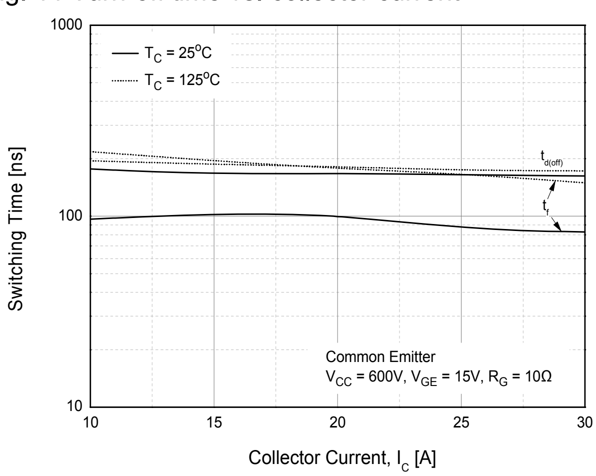
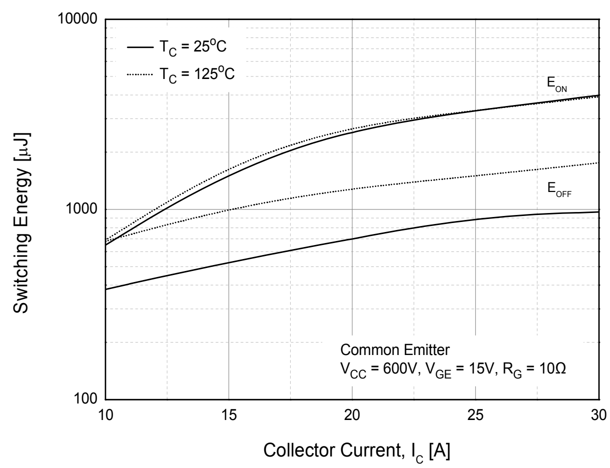


Fig. 12 Switching loss vs. collector current



IGBT Characteristics

Fig. 13 Gate charge characteristics

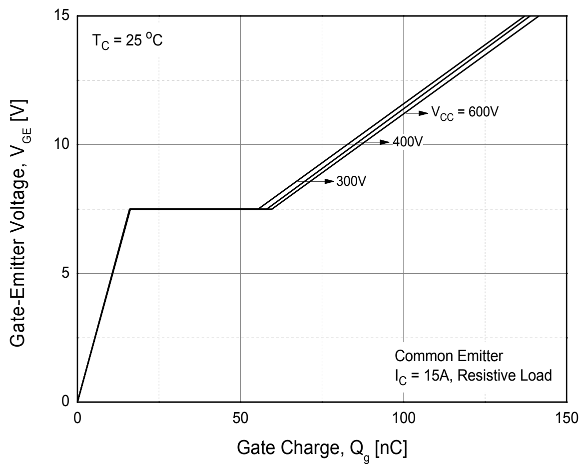


Fig. 14 SOA

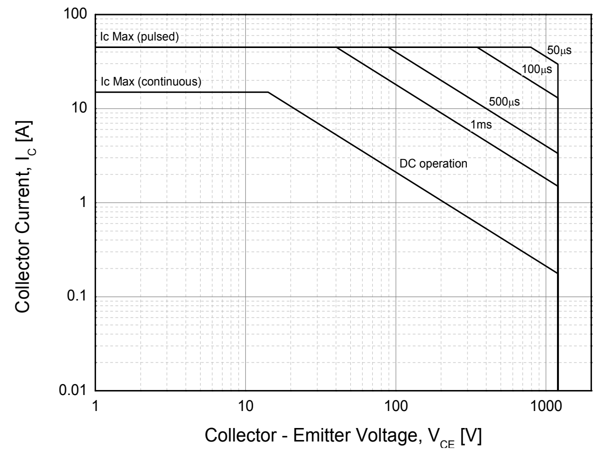


Fig. 15 RBSOA

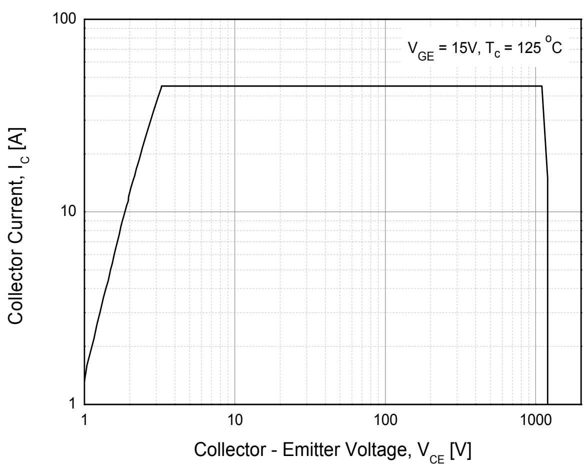


Fig. 16 Transient thermal impedance of IGBT

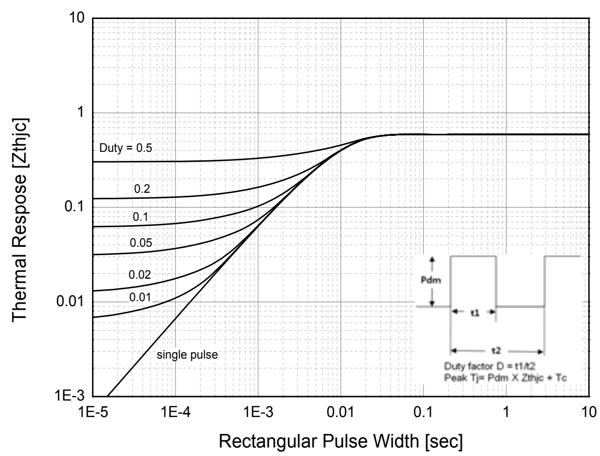
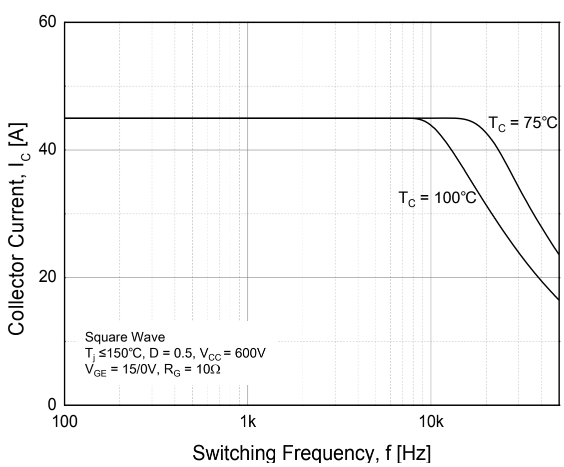


Fig. 17 Load Current vs. Frequency



Diode Characteristics

Fig. 18 Conduction characteristics

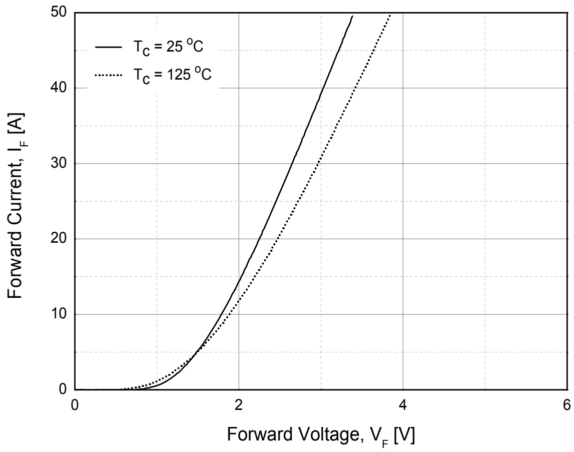


Fig. 19 Reverse recovery current vs. forward current

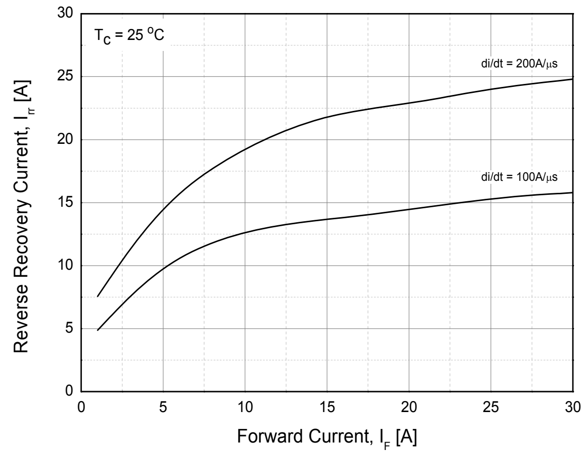


Fig. 20 Reverse recovery charge vs. forward current

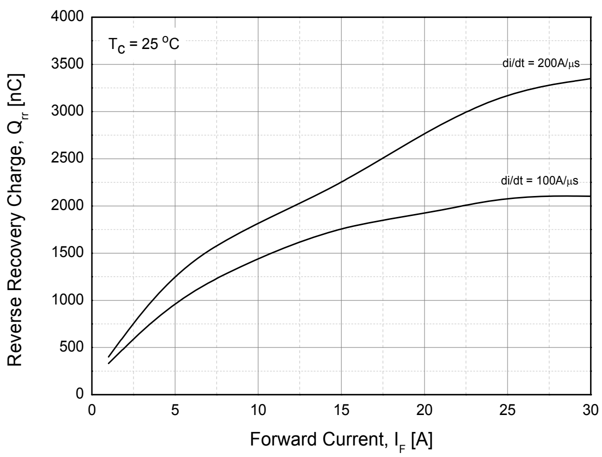
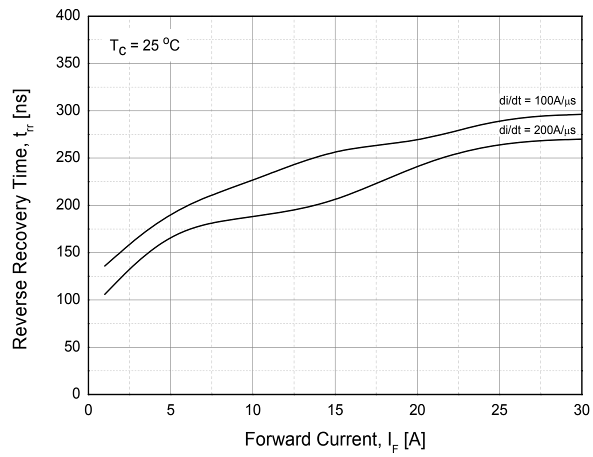
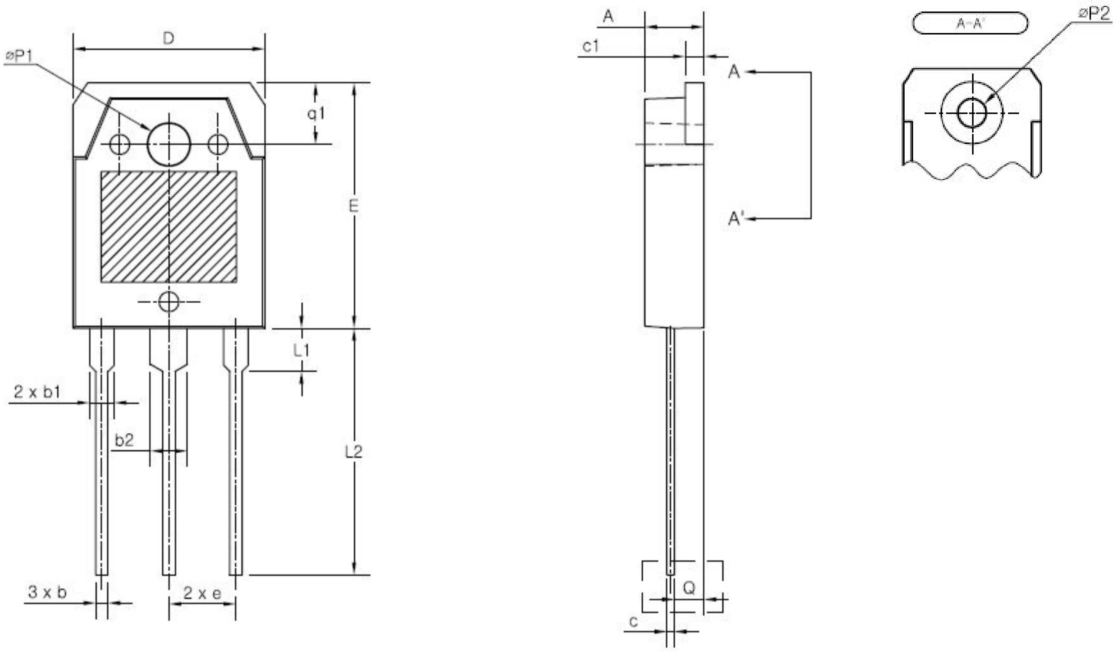


Fig. 21 Reverse recovery time vs. forward current



TO-3PN MECHANICAL DATA



SYMBOL	MIN	NOM	MAX
A	4.60	4.80	5.00
b	0.80	1.00	1.20
b1	1.80	2.00	2.20
b2	2.80	3.00	3.20
c	0.55	0.60	0.75
c1	1.45	1.50	1.65
D	15.40	15.60	15.80
E	19.70	19.90	20.10
e	5.15	5.45	5.75
L1	3.30	3.50	3.70
L2	19.80	20.00	20.20
øP1	3.30	3.40	3.50
øP2		(3.20)	
Q	2.20	2.40	2.60
q1	4.80	5.00	5.20

Notes

- **RoHS Compliance**
  The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2011/65/EC (RoHS2), as implemented March, 2013. RoHS Declarations for this product can be obtained from the Product Documentation sections of www.gptechgroup.com.

- **REACh Compliance**
  REACh substances of high concern (SVHCs) information is available for this product. Since the European Chemi- cal Agency (ECHA) has published notice of their intent to frequently revise the SVHC listing for the foreseeable future,please contact our office at GPTG Headquarters in Lake Forest, California to insure you get the most up-to-date REACh SVHC Declaration.
  REACh banned substance information (REACh Article 67) is also available upon request.

- This product has not been designed or tested for use in, and is not intended for use in, applications implanted into the human body nor in applications in which failure of the product could lead to death, personal injury or property damage, including but not limited to equipment used in the operation of nuclear facilities, life-support machines, cardiac defibrillators or similar emergency medical equipment, aircraft navigation or communication or control systems, or air traffic control.

- To obtain additional technical information or to place an order for this product, please contact us. The information in this datasheet is provided by Global Power Technologies Group. GPTG reserves the right to make changes, corrections, modifications, and improvements of datasheet without notice.

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