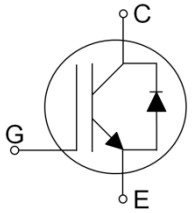
TGA15N120ND

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
TGA15N120ND	TO-3P	TGA15N120ND	RoHS

Absolute Maximum Ratings

Parameter		Symbol	Value	Unit
Collector-Emitter Voltage		V_{CES}	1200	V
Gate-Emitter Voltage		V_{GES}	±20	V
Continuous 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	184	W
	T_C = 100 ℃		74	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 max junction temperature

Thermal Characteristics

Parameter	Symbol	Value	Unit
Maximum Thermal resistance, Junction-to-Case	$R_{\theta JC}$ (IGBT)	0.68	℃/W
Maximum Thermal resistance, Junction-to-Case	$R_{\theta JC}$ (DIODE)	3.7	℃/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	Units
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_J=25 °C	--	1.9	--	V
		V_{GE}= 15V, I_C =15A, T_J=125 °C	--	2.2	--	V
DYNAMIC						
Input Capacitance	C_{IES}	V_{CE}= 30V, V_{GE}= 0V f =1MHz	--	2650	--	pF
Output Capacitance	C_{OES}		--	150	--	pF
Reverse Transfer Capacitance	C_{RES}		--	96	--	pF
SWITCHING						
Turn-On Delay Time	$t_{d(on)}$	V_{CC}= 600V, I_C =15A R_G= 10Ω, V_{GE}= 15V Inductive Load, T_J=25 °C	--	34	--	ns
Rise Time	t_r		--	106	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	192	--	ns
Fall Time	t_f		--	94	--	ns
Turn-On Switching Loss	E_{ON}		--	2.10	--	mJ
Turn-Off Switching Loss	E_{OFF}		--	0.54	--	mJ
Total Switching Loss	E_{TS}		--	2.64	--	mJ
Turn-On Delay Time	$t_{d(on)}$	V_{CC}= 600V, I_C =15A R_G= 10Ω, V_{GE}= 15V Inductive Load, T_J=125 °C	--	31	--	ns
Rise Time	t_r		--	107	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	204	--	ns
Fall Time	t_f		--	86	--	ns
Turn-On Switching Loss	E_{ON}		--	2.20	--	mJ
Turn-Off Switching Loss	E_{OFF}		--	0.93	--	mJ
Total Switching Loss	E_{TS}		--	3.13	--	mJ
Total Gate Charge	Q_g	V_{CC}= 600V, I_C =15A V_{GE}= 15V	--	110	--	nC
Gate-Emitter Charge	Q_{ge}		--	15	--	nC
Gate-Collector Charge	Q_{gc}		--	40	--	nC

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

Parameter	Symbol	Test condition		Min	Typ	Max	Units
Diode Forward Voltage	V_{FM}	I_F = 15 A	T_J=25 °C	--	2.0	--	V
			T_J=125 °C	--	2.2	--	
Reverse Recovery Time	t_{rr}	I_F = 15 A, dI/dt=200A/us	T_J=25 °C	--	200	--	ns
			T_J=125 °C	--	270	--	
Reverse Recovery Current	I_{rr}		T_J=25 °C	--	22		A
			T_J=125 °C	--	28		
Reverse Recovery Charge	Q_{rr}		T_J=25 °C	--	2230		nC
			T_J=125 °C	--	3750		

IGBT Performance Characteristics

Fig. 1 Output characteristics

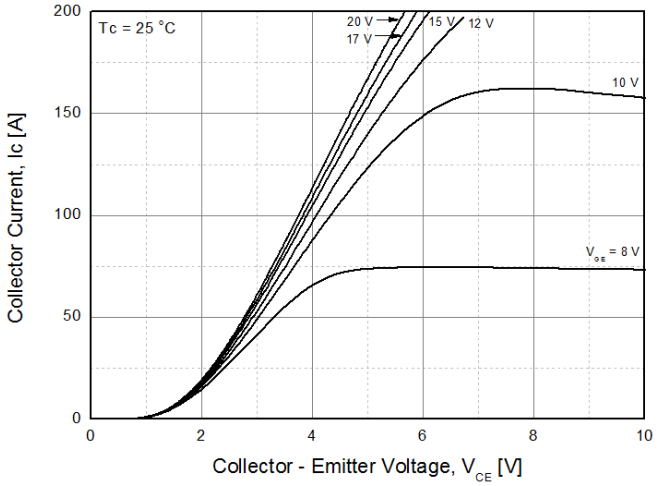


Fig. 2 Saturation voltage characteristics

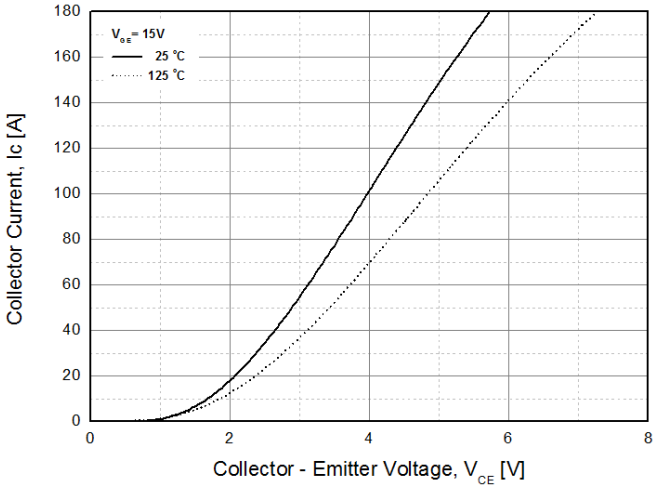


Fig. 3 Saturation voltage vs. collector current

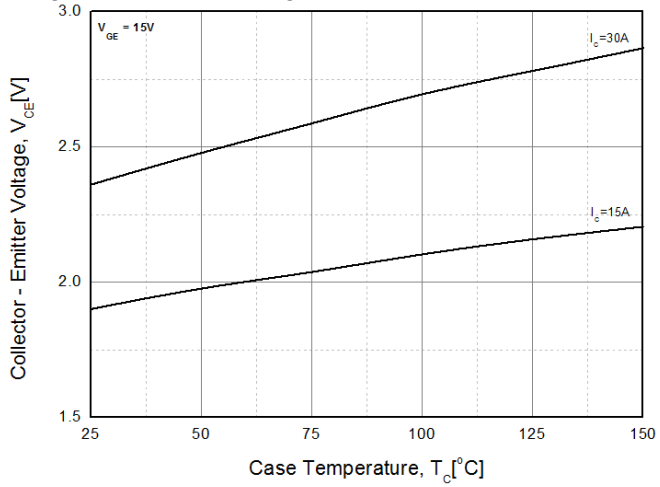


Fig. 4 Saturation voltage vs. gate bias

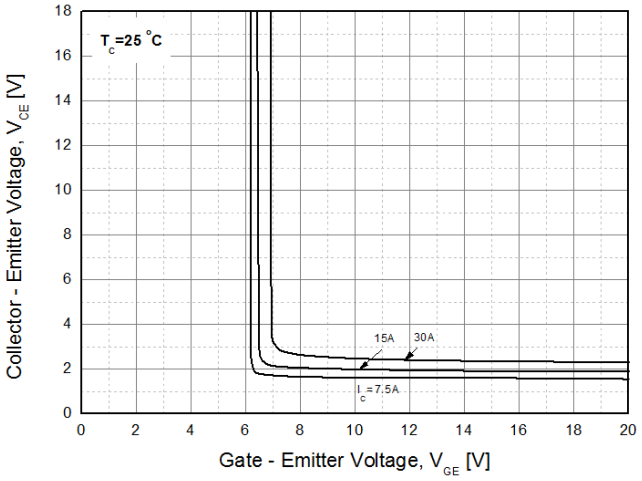


Fig. 5 Saturation voltage vs. gate bias

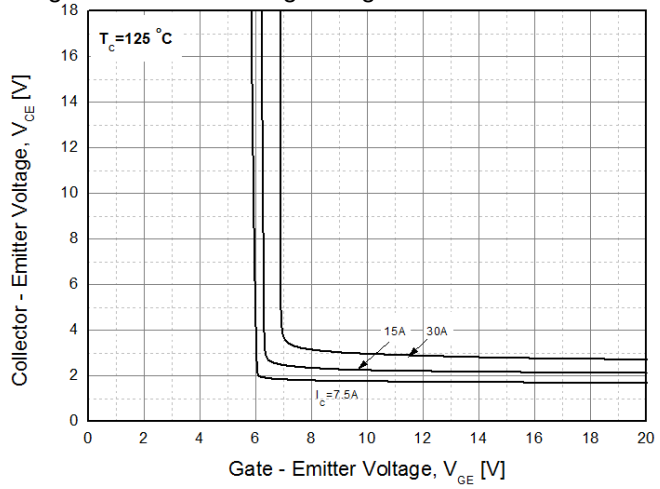
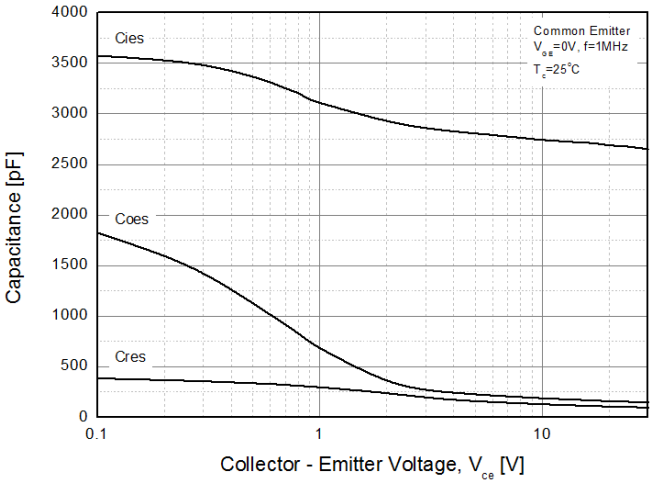


Fig. 6 Capacitance characteristics



IGBT Performance Characteristics

Fig. 7 Turn on time vs. gate resistance

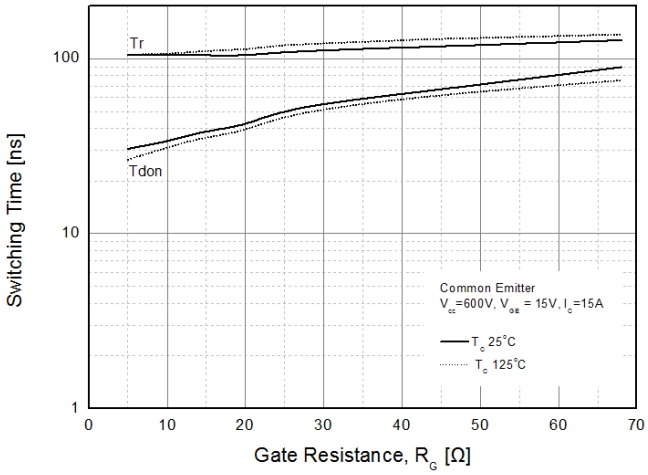


Fig. 8 Turn off time vs. gate resistance

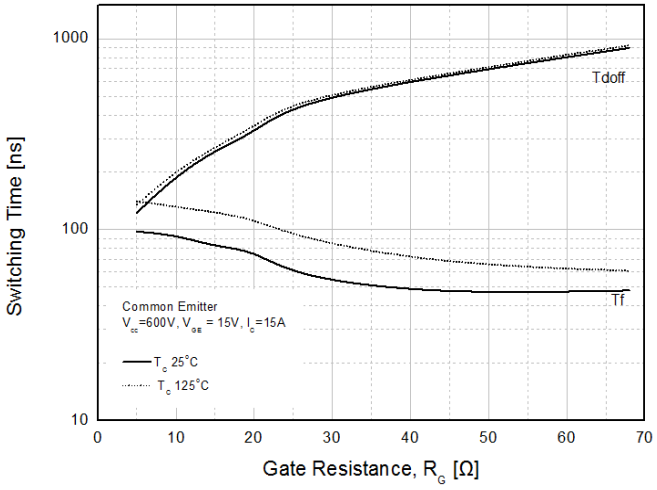


Fig. 9 Switching loss vs. gate resistance

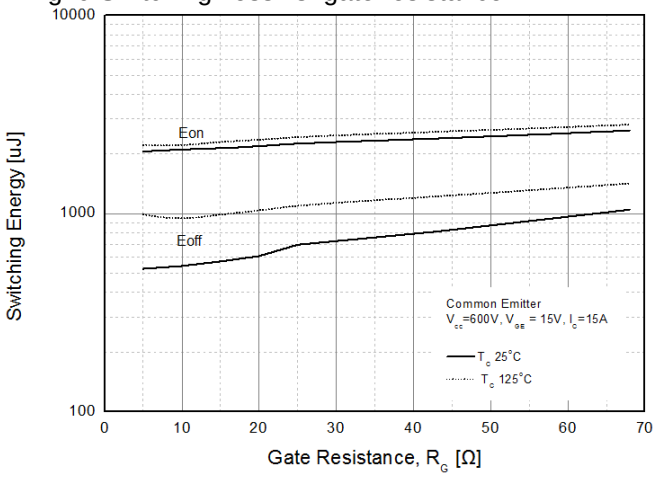


Fig. 10 Turn on time vs. collector current

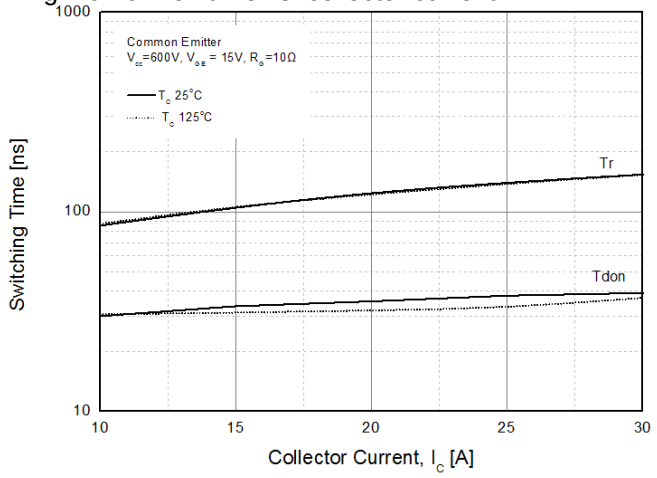


Fig. 11 Turn off time vs. collector current

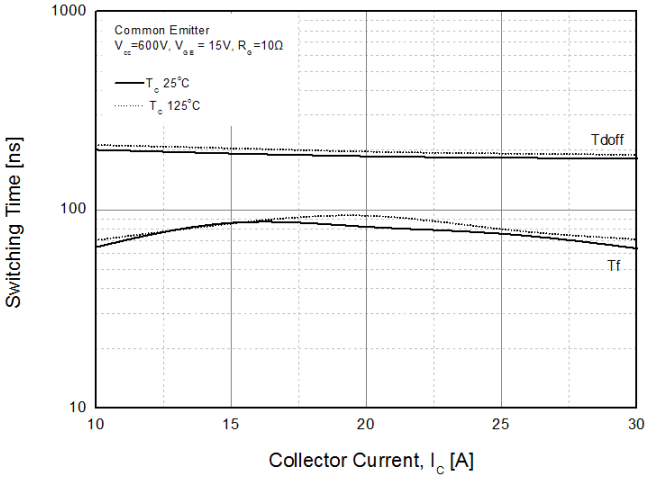
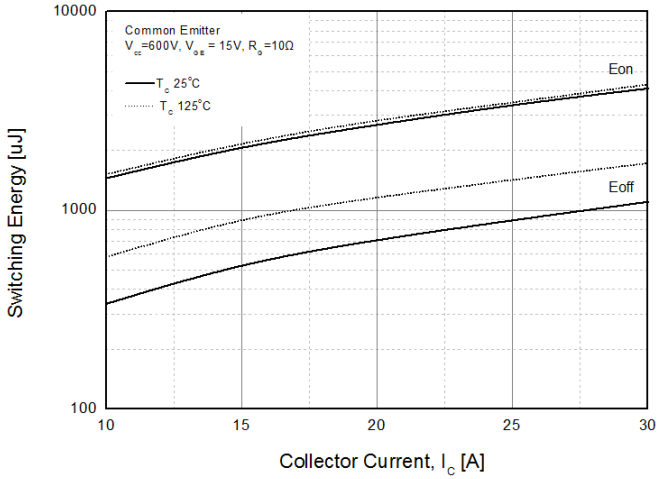


Fig. 12 Switching loss vs. collector current



IGBT Performance Characteristics

Fig. 13 Gate charge characteristics

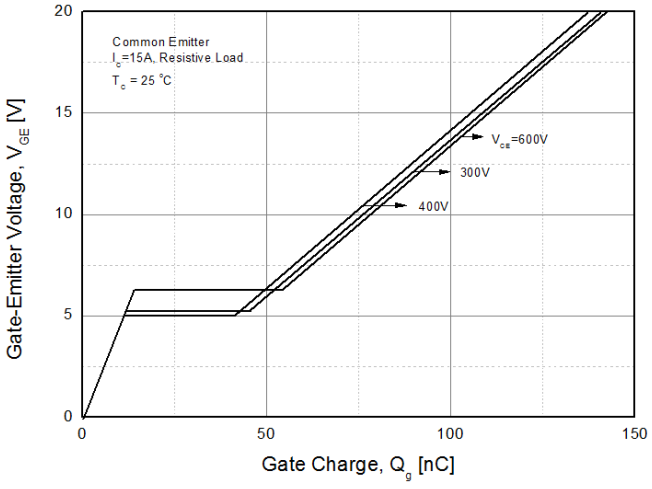


Fig. 14 SOA

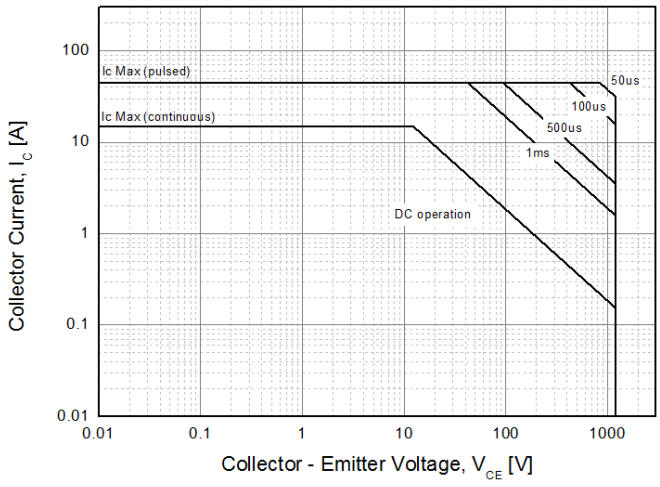


Fig. 15 RBSOA

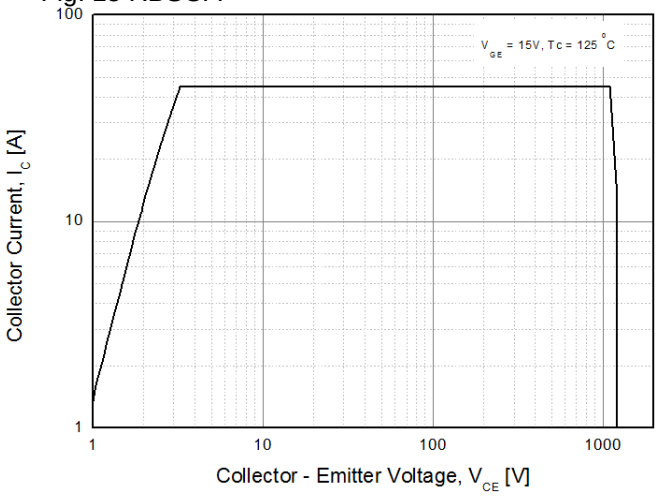
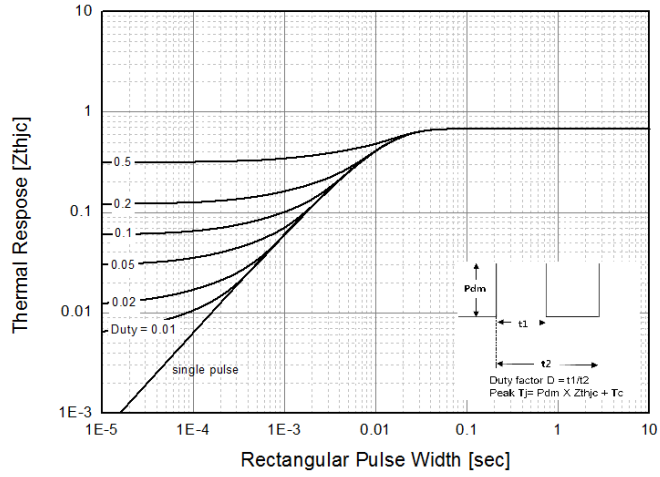


Fig. 16 Transient thermal impedance



DIODE Performance Characteristics

Fig. 17 Conduction characteristics

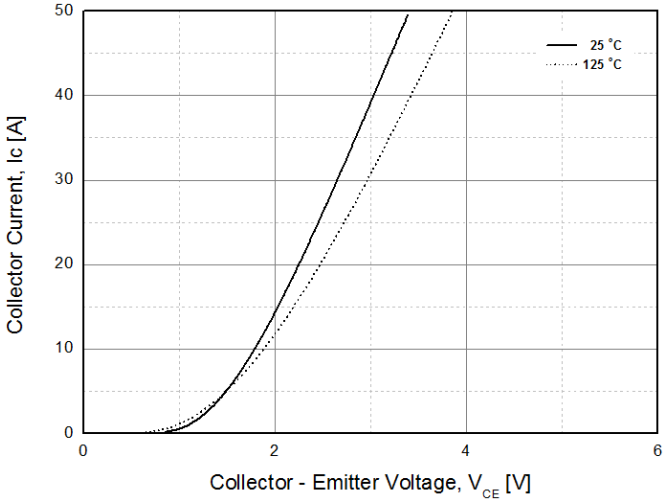


Fig. 18 Reverse recovery current vs. forward current

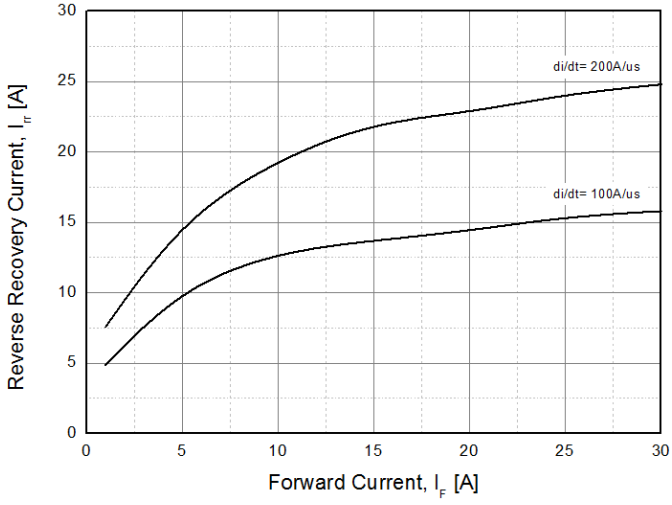


Fig. 19 Stored recovery charge vs. forward current

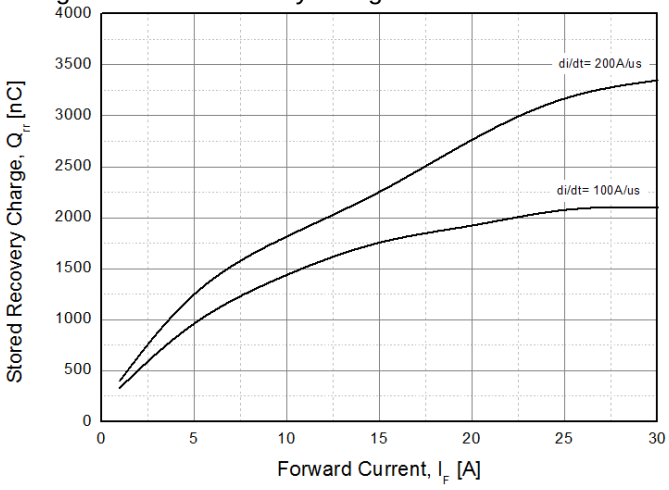


Fig. 18 Reverse recovery time vs. forward current