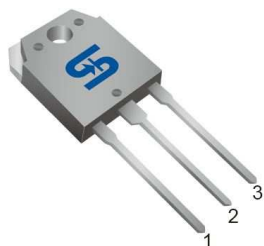


TO-3PN



Pin Definition:

1. Gate
2. Collector
3. Emitter

PRODUCT SUMMARY

V_{CES} (V)	V_{GES} (V)	I_C (A)
1200	±20	15

General Description

The TSG15N120CN using proprietary trench design and advanced NPT technology, the 1200V NPT IGBT offers superior conduction and switching performances, high avalanche ruggedness and easy parallel operation. This device is well suited for the resonant or soft switching application such as induction heating, microwave oven, etc.

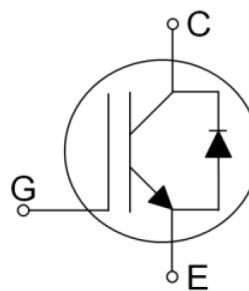
Features

- 1200V NPT Trench Technology
- High Speed Switching
- Low Conduction Loss

Ordering Information

Part No.	Package	Packing
TSG15N120CN C0	TO-3PN	30pcs / Tube

Block Diagram



NPT Trench IGBT

Absolute Maximum Rating ($T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Limit	Unit	
Collector-Emitter Voltage	V_{CES}	1200	V	
Gate-Emitter Voltage	V_{GES}	±20	V	
Continuous Current	I_C	$T_C=25^\circ\text{C}$	30	A
		$T_C=100^\circ\text{C}$	15	A
Pulsed Collector Current *	I_{CM}	45	A	
Diode Forward Current ($T_C=100^\circ\text{C}$)	I_F	15	A	
Diode Pulse Forward Current	I_{FM}	45	A	
Max Power Dissipation	P_D	$T_J=25^\circ\text{C}$	184	W
		$T_J=100^\circ\text{C}$	74	
Operating Junction Temperature	T_J	-55 to +150	$^\circ\text{C}$	
Storage Temperature Range	T_{STG}	-55 to +150	$^\circ\text{C}$	

* Repetitive rating: Pulse width limited by max. junction temperature

Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance - Junction to Case	IGBT	0.68	°C/W
	DIODE	3.7	
Thermal Resistance - Junction to Ambient	$R_{\theta JA}$	40	

Electrical Specifications (T_C=25°C unless otherwise noted)

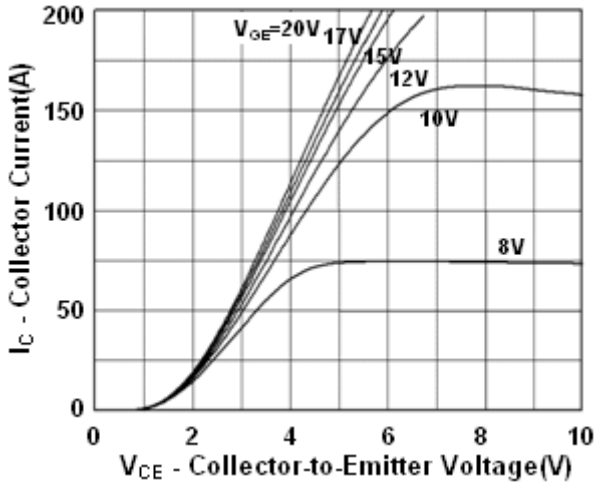
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Collector-Emitter Breakdown Voltage	V _{GE} = 0V, I _C = 1mA	BV _{CES}	1200	--	--	V
Zero Gate Voltage Collector Current	V _{CE} = 1200V, V _{GE} = 0V	I _{CES}	--	--	1	mA
Gate-Emitter Leakage Current	V _{GE} = 20V, V _{CE} = 0V	I _{GES}	--	--	±250	nA
Gate-Emitter Threshold Voltage	V _{GE} = V _{CE} , I _C = 15mA	V _{GE(TH)}	3.0	5.0	7.0	V
Collector-Emitter Saturation Voltage	V _{GE} = 15V, I _C = 15A, T _J = 25°C	V _{CE(SAT)}	--	1.9	--	V
	V _{GE} = 15V, I _C = 15A, T _J = 125°C	V _{CE(SAT)}	--	2.2	--	V
Dynamic						
Input Capacitance	V _{CE} = 30V, V _{GE} = 0V, f = 1.0MHz	C _{IES}	--	2650	--	pF
Output Capacitance		C _{OES}	--	150	--	
Reverse Transfer Capacitance		C _{RES}	--	96	--	
Switching						
Turn-On Delay Time	V _{CC} = 600V, I _C = 15A, R _G = 10Ω, V _{GE} = 15V Inductive Load, T _J = 25°C	t _{d(on)}	--	34	--	nS
Rise Time		t _r	--	106	--	
Turn-Off Delay Time		t _{d(off)}	--	192	--	
Fall Time		t _f	--	94	--	
Turn-On Switching Loss		E _{on}	--	2.10	--	mJ
Turn-Off Switching Loss		E _{off}	--	0.54	--	
Total Switching Loss	E _{ts}	--	2.64	--		
Turn-On Delay Time	V _{CC} = 600V, I _C = 15A, R _G = 10Ω, V _{GE} = 15V Inductive Load, T _J = 125°C	t _{d(on)}	--	31	--	nS
Rise Time		t _r	--	107	--	
Turn-Off Delay Time		t _{d(off)}	--	204	--	
Fall Time		t _f	--	86	--	
Turn-On Switching Loss		E _{on}	--	2.20	--	mJ
Turn-Off Switching Loss		E _{off}	--	0.93	--	
Total Switching Loss	E _{ts}	--	3.13	--		
Total Gate Charge	V _{CC} = 600V, I _C = 15A, V _{GE} = 15V	Q _g	--	110	--	nC
Gate-Emitter Charge		Q _{ge}	--	15	--	
Gate-Collector Charge		Q _{gc}	--	40	--	

Electrical Specifications of the DIODE ($T_c=25^\circ\text{C}$ unless otherwise noted)

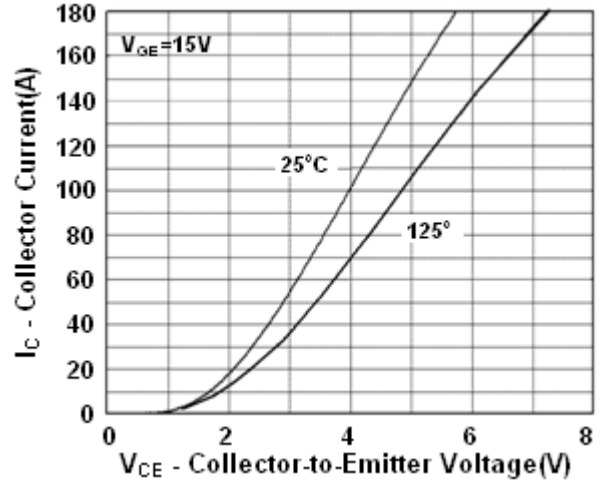
Parameter	Conditions		Symbol	Min	Typ	Max	Unit
Diode Forward Voltage	$I_F = 15\text{A}$,	$T_J=25^\circ\text{C}$	V_{FM}	--	2.0	--	V
		$T_J=125^\circ\text{C}$		--	2.2	--	V
Reverse Recovery Time	$I_F = 15\text{A}$, $di/dt=200\text{A}/\mu\text{s}$	$T_J=25^\circ\text{C}$	t_{fr}	--	200	--	ns
		$T_J=125^\circ\text{C}$		--	270	--	
Reverse Recovery Current		$T_J=25^\circ\text{C}$	I_{fr}	--	22	--	A
		$T_J=125^\circ\text{C}$		--	28	--	
Reverse Recovery Charge	$T_J=25^\circ\text{C}$	Q_{fr}	--	2230	--	nC	
	$T_J=125^\circ\text{C}$		--	3750	--		

Electrical Characteristics Curve ($T_c = 25^\circ\text{C}$, unless otherwise noted)

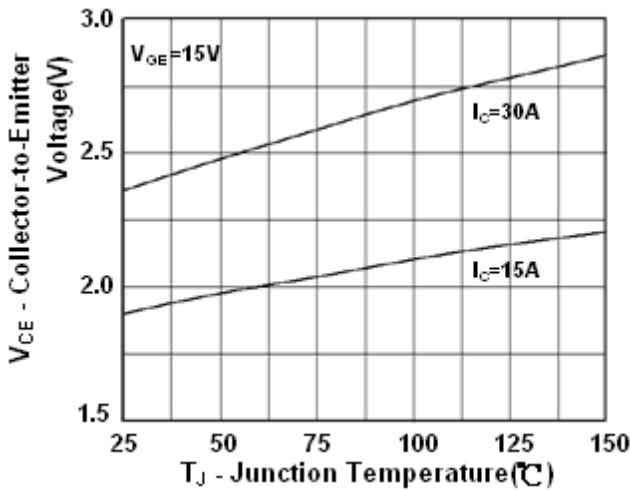
Output Characteristics



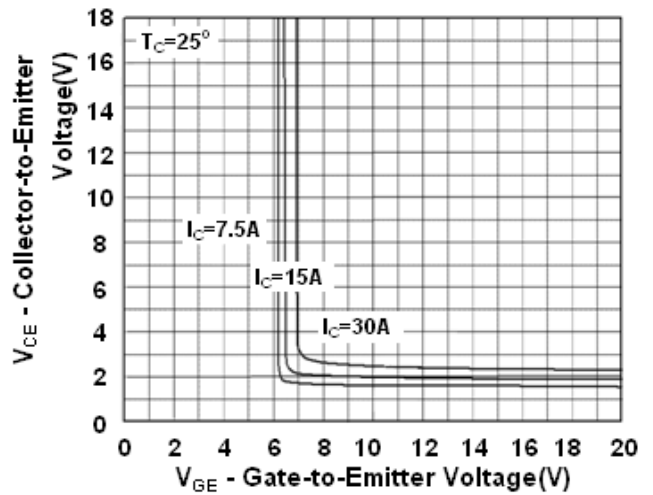
Saturation voltage characteristics



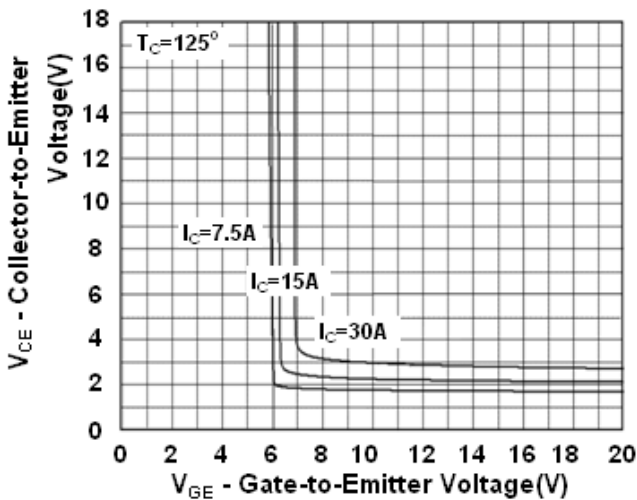
Saturation voltage vs. collector current



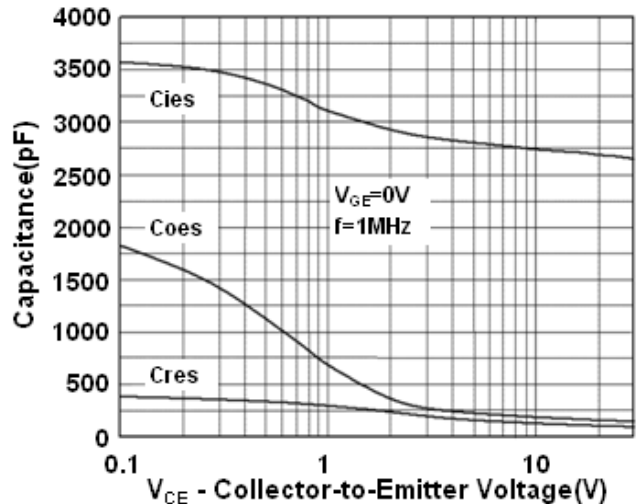
Saturation voltage vs. gate bias



Saturation voltage vs. gate bias

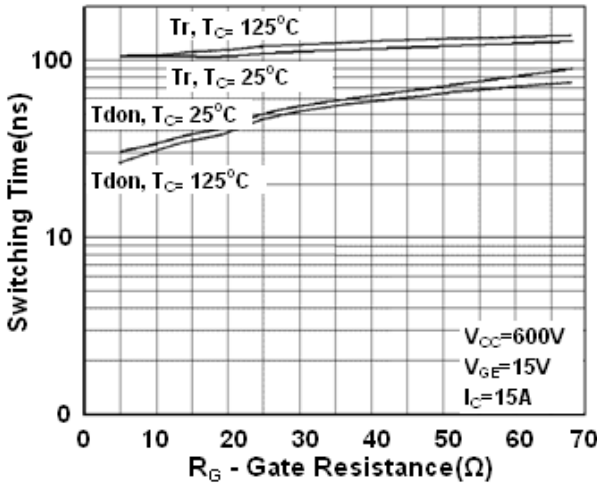


Capacitance characteristics

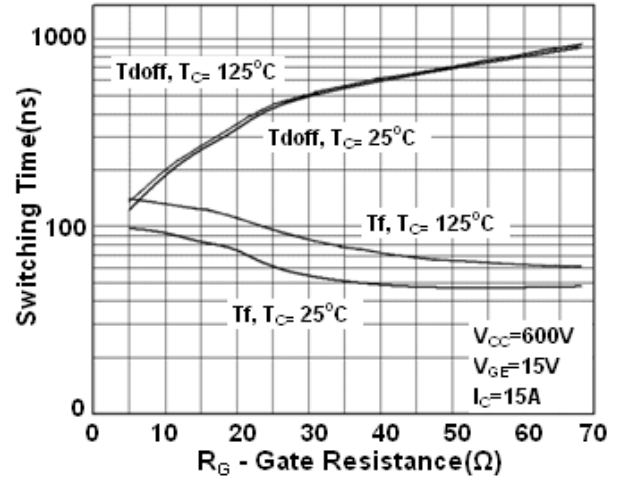


Electrical Characteristics Curve ($T_a = 25^\circ\text{C}$, unless otherwise noted)

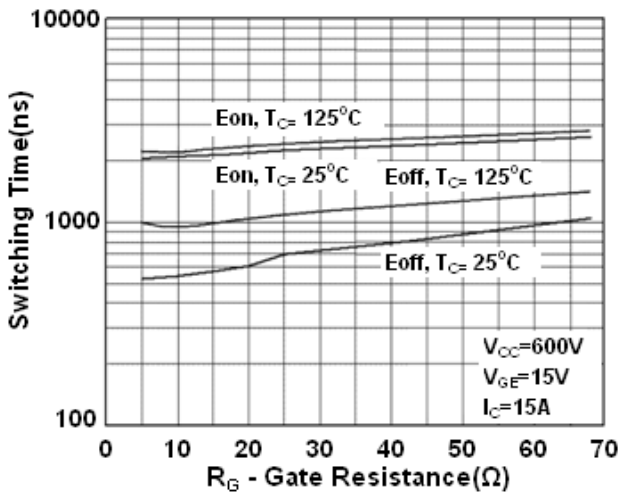
Turn on time vs. gate resistance



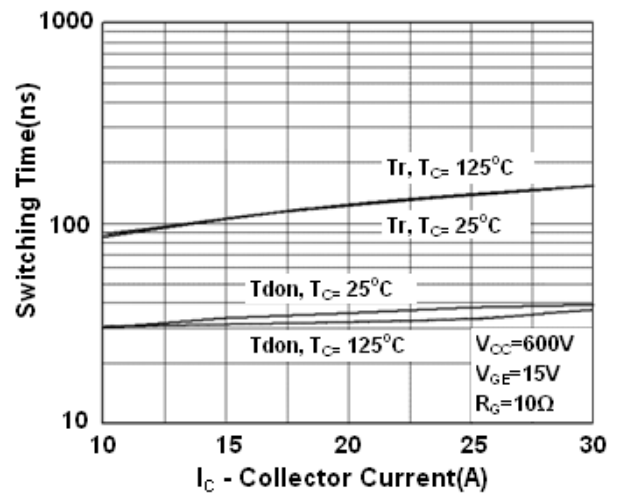
Turn off time vs. gate resistance



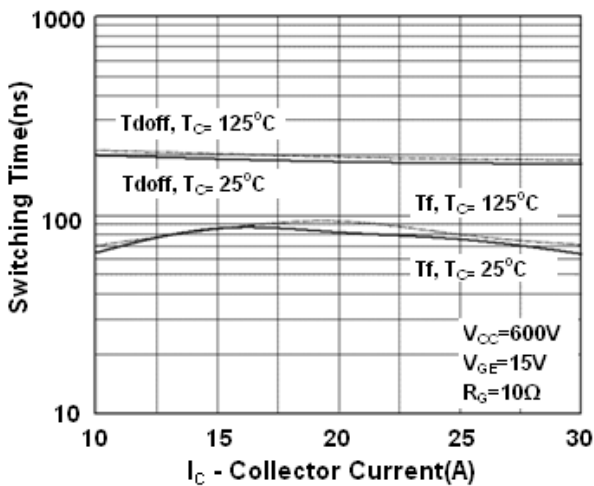
Switching loss vs. gate resistance



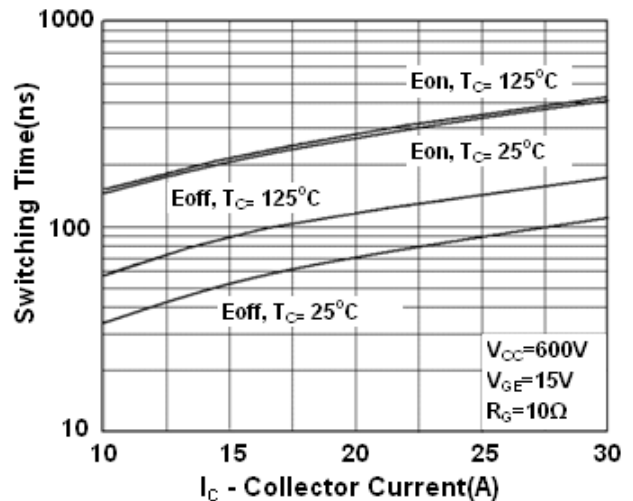
Turn on time vs. collector current



Turn off time vs. collector current

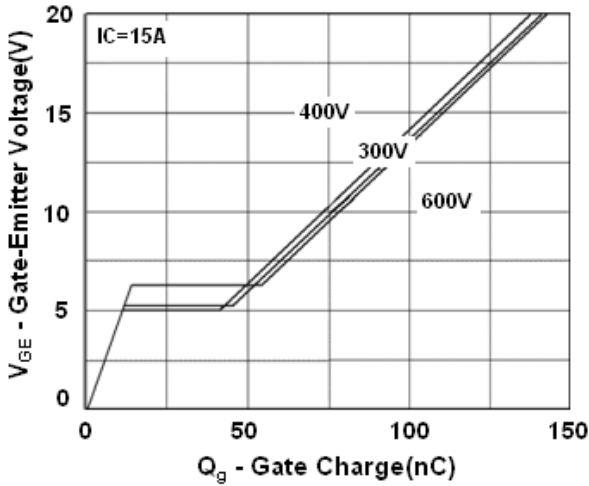


Switching loss vs. collector current

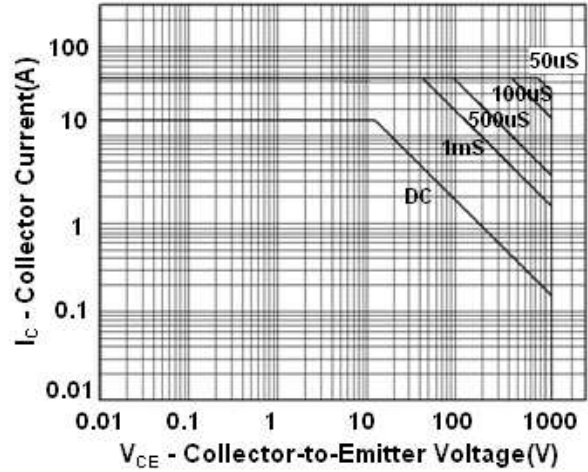


Electrical Characteristics Curve ($T_c = 25^\circ\text{C}$, unless otherwise noted)

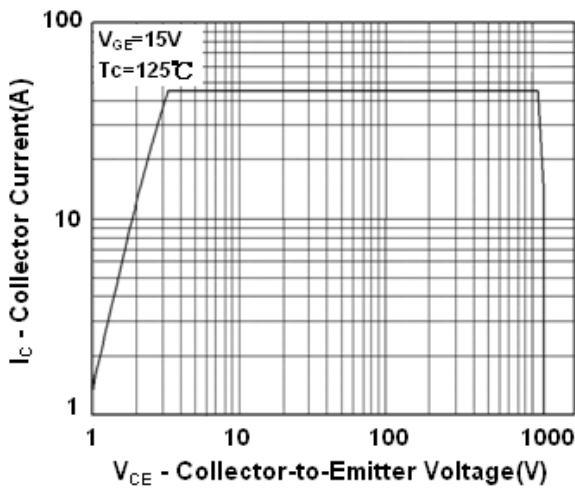
Gate charge characteristics



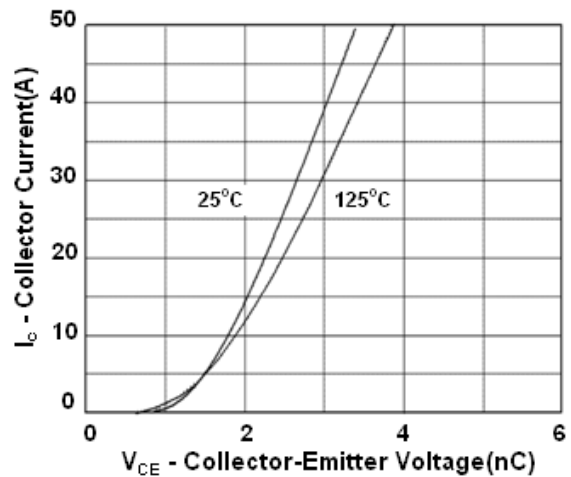
SOA Characteristics



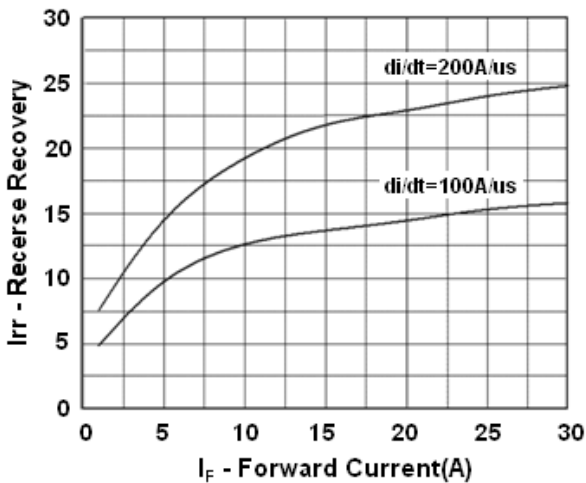
RBSOA



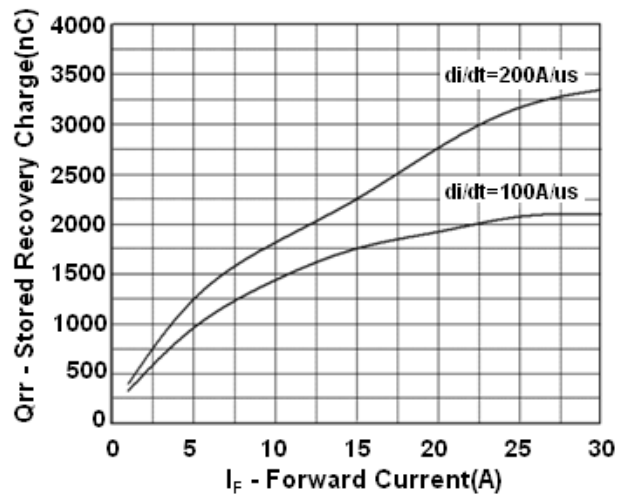
Conduction characteristics



Reverse recovery current vs. forward current

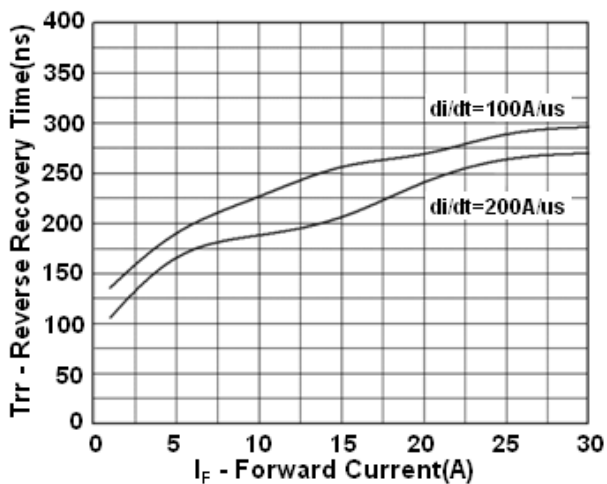


Stored recovery charge vs. forward current

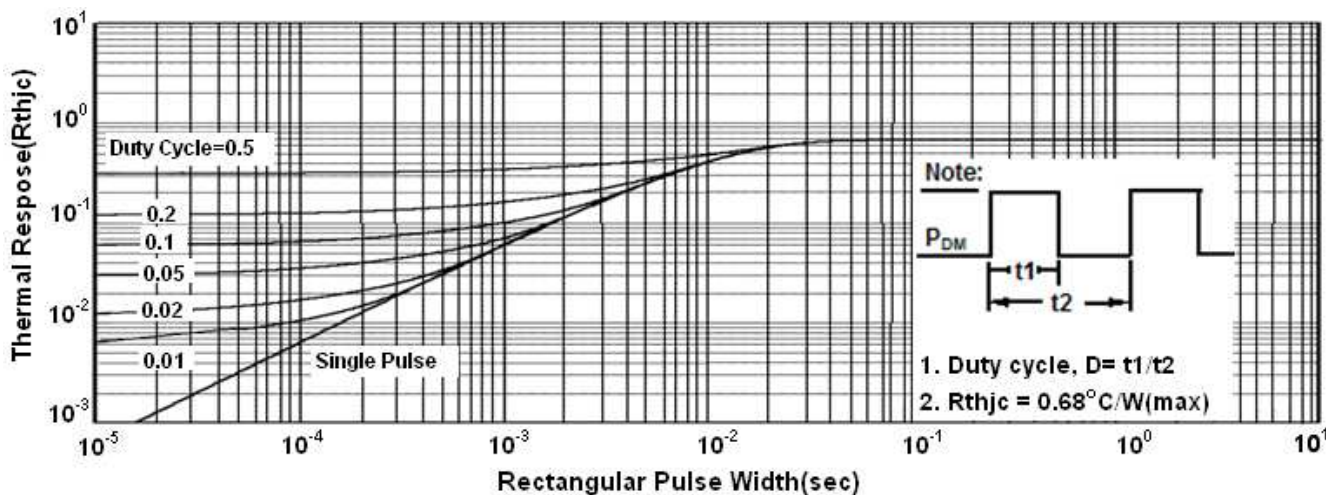


Electrical Characteristics Curve ($T_a = 25^\circ\text{C}$, unless otherwise noted)

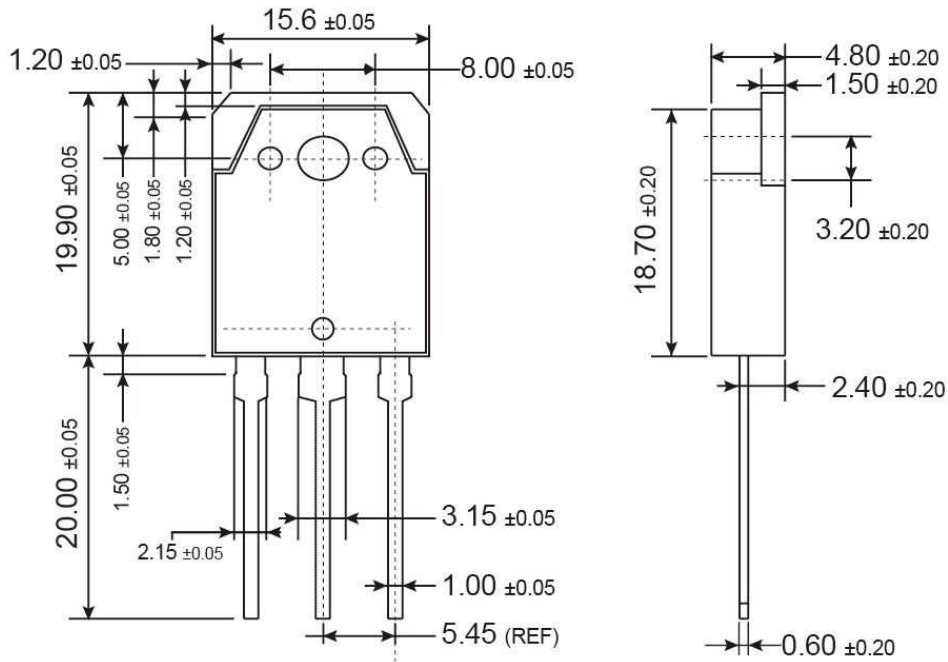
Reverse recovery time vs. forward current



Normalized Thermal Transient Impedance, Junction-to-Ambient



TO-3PN Mechanical Drawing



Unit: Millimeters

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