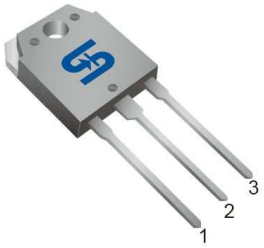
TAIWAN SEMICONDUCTOR

RoHS COMPLIANCE

TSG25N120CN

N-Channel IGBT with FRD.

TO-3PN



Pin Definition:
1. Gate
2. Collector
3. Emitter

PRODUCT SUMMARY

V_{CES} (V)	V_{GES} (V)	I_C (A)
1200	±20	25

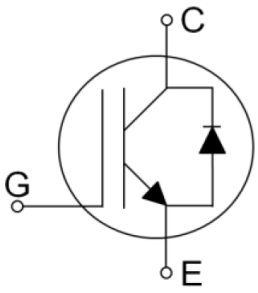
General Description

The TSG25N120CN 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

Block Diagram



NPT Trench IGBT

Ordering Information

Part No.	Package	Packing
TSG25N120CN C0	TO-3PN	30pcs / Tube

Absolute Maximum Rating (T_A=25°C unless otherwise noted)

Parameter		Symbol	Limit	Unit
Collector-Emitter Voltage		V_{CES}	1200	V
Gate-Emitter Voltage		V_{GES}	±20	V
Continuous Current	T_C=25°C	I_C	50	A
	T_C=100°C		25	A
Pulsed Collector Current *		I_{CM}	75	A
Diode Forward Current (T_C=100℃)		I_F	25	A
Diode Pulse Forward Current		I_{FM}	75	A
Max Power Dissipation	T_J=25°C	P_D	312	W
	T_J=100°C		125	
Operating Junction Temperature		T_J	-55 to +150	ºC
Storage Temperature Range		T_{STG}	-55 to +150	°C

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

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Thermal Performance

Parameter		Symbol	Limit	Unit
Thermal Resistance - Junction to Case	IGBT	$R\Theta_{JC}$	0.4	°C/W
	DIODE		2.2	
Thermal Resistance - Junction to Ambient		$R\Theta_{JA}$	40	

Electrical Specifications (Tc=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 = 25mA	$V_{GE(TH)}$	3.0	5.0	7.0	V
Collector-Emitter Saturation Voltage	V_{GE} = 15V,I_C =25A, T_J=25ºC	$V_{CE(SAT)}$	--	1.9	2.5	V
	V_{GE} = 15V,I_C =25A, T_J=125ºC	$V_{CE(SAT)}$	--	2.2	--	V
Dynamic						
Input Capacitance	V_{CE} = 30V, V_{GE} = 0V, f = 1.0MHz	C_{IES}	--	4000	--	pF
Output Capacitance		C_{OES}	--	105	--	
Reverse Transfer Capacitance		C_{RES}	--	72	--	
Switching						
Turn-On Delay Time	V_{CC} = 600V, I_C = 25A, R_G = 10Ω, V_{GE} = 15V Inductive Load, T_J=25°C	$t_{d(on)}$	--	57	--	nS
Rise Time		t_r	--	65	--	
Turn-Off Delay Time		$t_{d(off)}$	--	240	--	
Fall Time		t_f	--	86	160	
Turn-On Switching Loss		E_{on}	--	4.15	6.22	mJ
Turn-Off Switching Loss		E_{off}	--	0.87	1.31	
Total Switching Loss		E_{ts}	--	5.02	7.53	
Turn-On Delay Time	V_{CC} = 600V, I_C = 25A, R_G = 10Ω, V_{GE} = 15V Inductive Load, T_J=125°C	$t_{d(on)}$	--	41	--	nS
Rise Time		t_r	--	57	--	
Turn-Off Delay Time		$t_{d(off)}$	--	265	--	
Fall Time		t_f	--	168	--	
Turn-On Switching Loss		E_{on}	--	4.46	6.69	mJ
Turn-Off Switching Loss		E_{off}	--	1.74	2.61	
Total Switching Loss		E_{ts}	--	6.2	9.3	
Total Gate Charge	V_{CC} = 600V, I_C = 25A, V_{GE} = 15V	Q_g	--	170	255	nC
Gate-Emitter Charge		Q_{ge}	--	27	41	
Gate-Collector Charge		Q_{gc}	--	60	90	

Electrical Specifications of the DIODE (Tc=25°C unless otherwise noted)

Parameter	Conditions		Symbol	Min	Typ	Max	Unit
Diode Forward Voltage	I_F = 25A,	T_J=25°C	V_{FM}	--	2.0	2.5	V
		T_J=125°C		--	2.18	--	V
Reverse Recovery Time	I_F = 25A, dl/dt=200A/us	T_J=25°C	t_{fr}	--	300	480	ns
		T_J=125°C		--	360	--	
Reverse Recovery Current		T_J=25°C	I_{fr}	--	27	41	A
		T_J=125°C		--	31	--	
Reverse Recovery Charge		T_J=25°C	Q_{fr}	--	4000	6000	nC
		T_J=125°C		--	5580	--	

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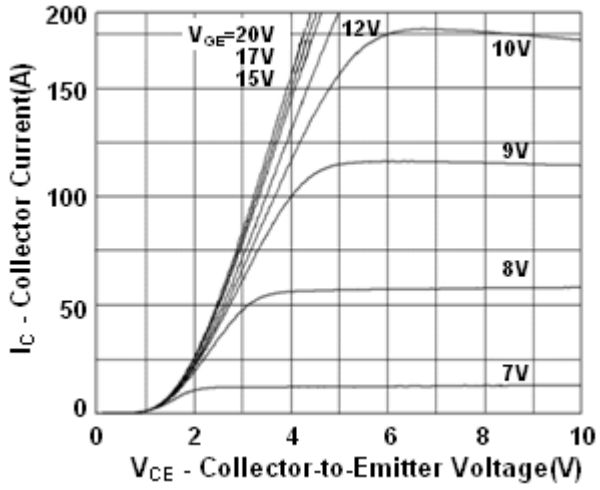
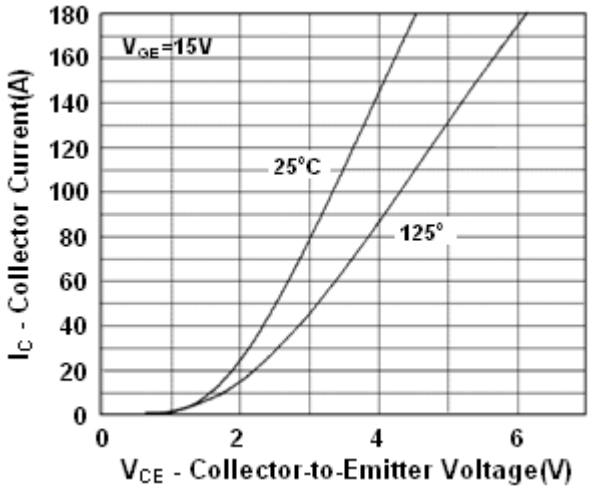
Electrical Characteristics Curve (Tc = 25°C, unless otherwise noted)

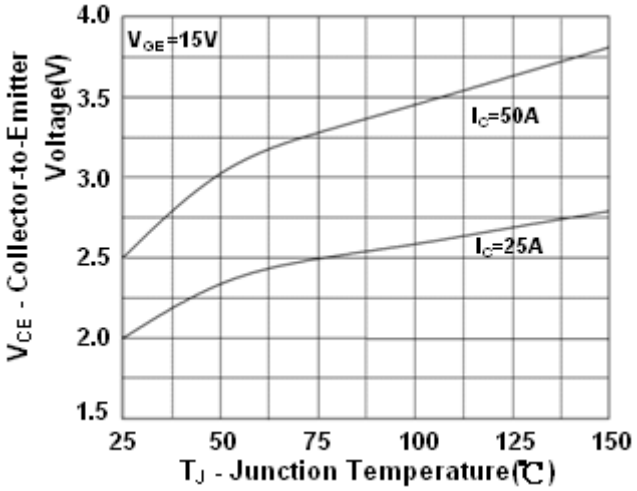
Output Characteristics



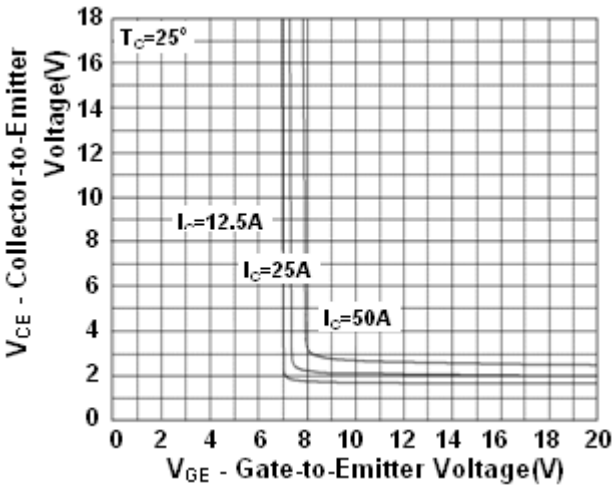
Saturation voltage characteristics



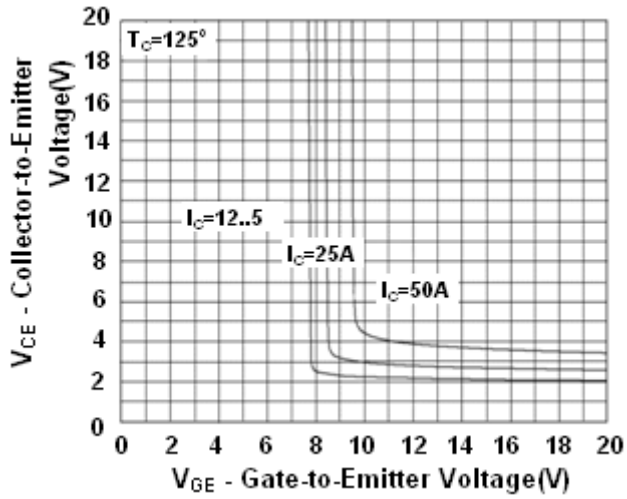
Saturation voltage vs. collector current



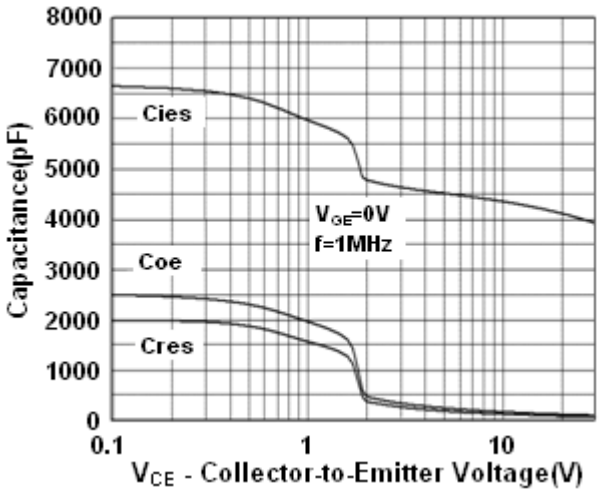
Saturation voltage vs. gate bias



Saturation voltage vs. gate bias



Capacitance characteristics



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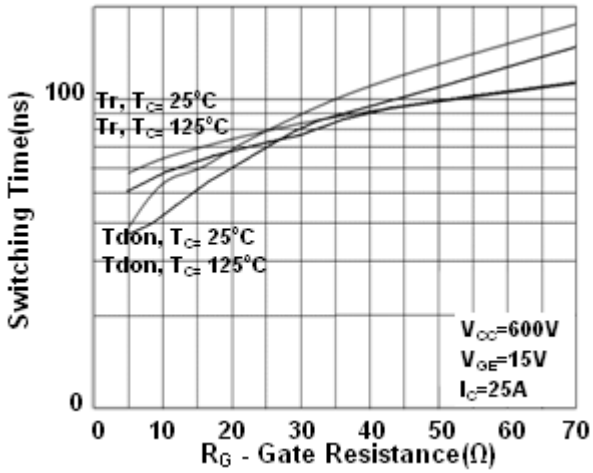
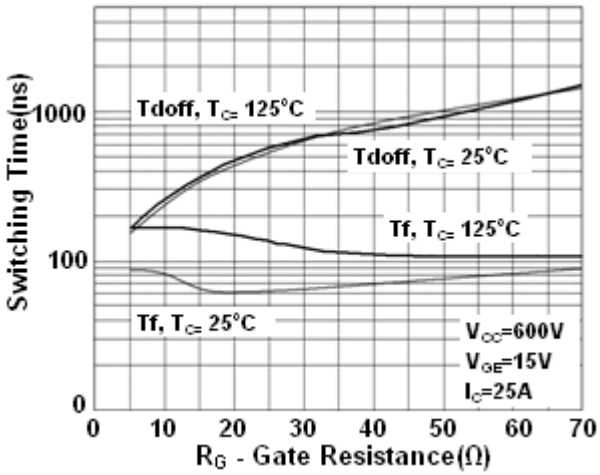
N-Channel IGBT with FRD.

Electrical Characteristics Curve (Ta = 25°C, unless otherwise noted)

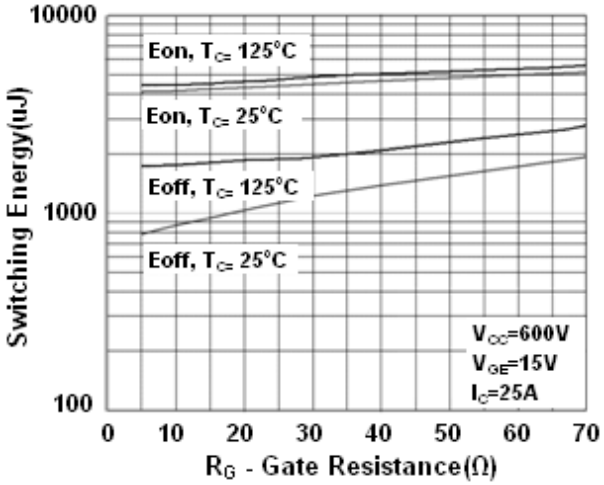
Turn on time vs. gate resistance



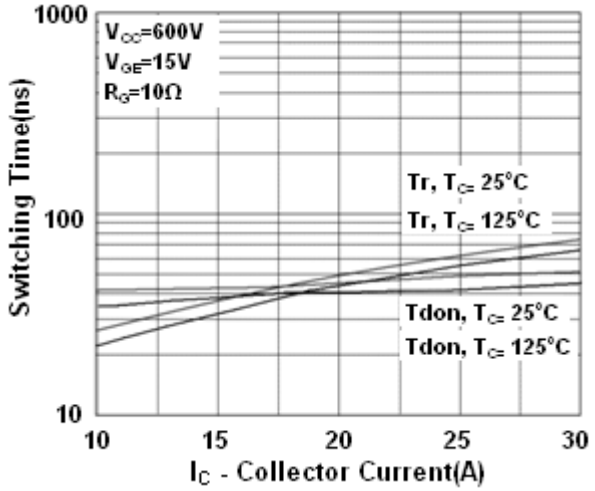
Turn off time vs. gate resistance



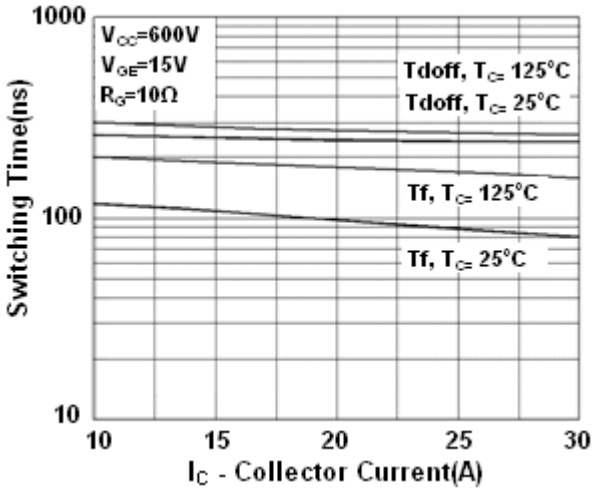
Switching loss vs. gate resistance



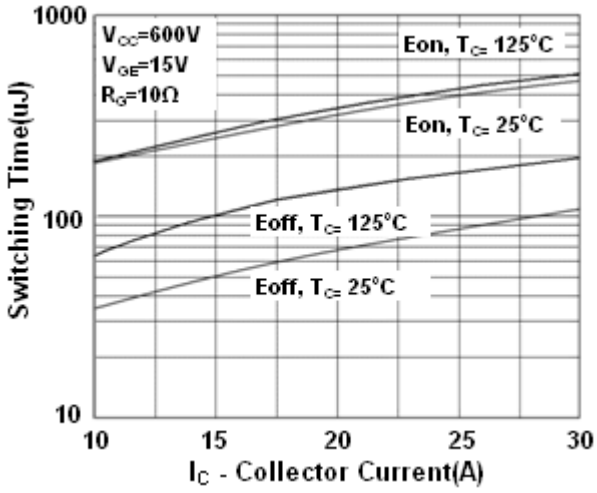
Turn on time vs. collector current



Turn off time vs. collector current



Switching loss vs. collector current



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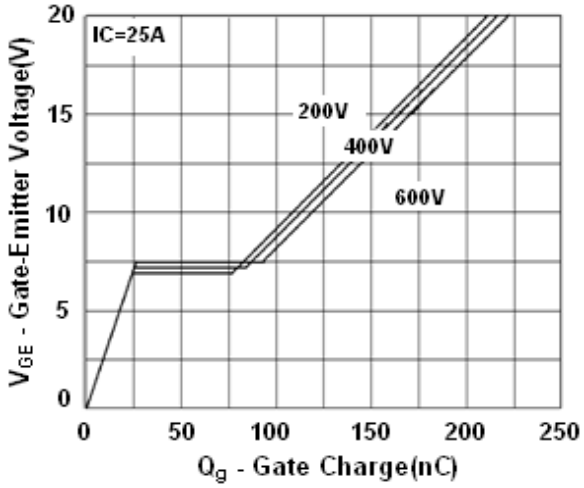
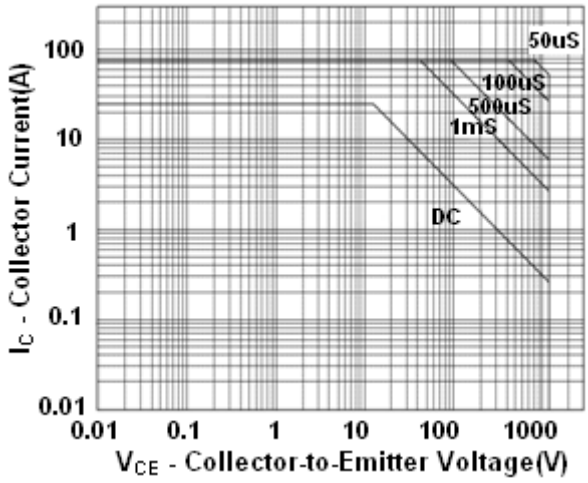
Electrical Characteristics Curve (Tc = 25°C, unless otherwise noted)

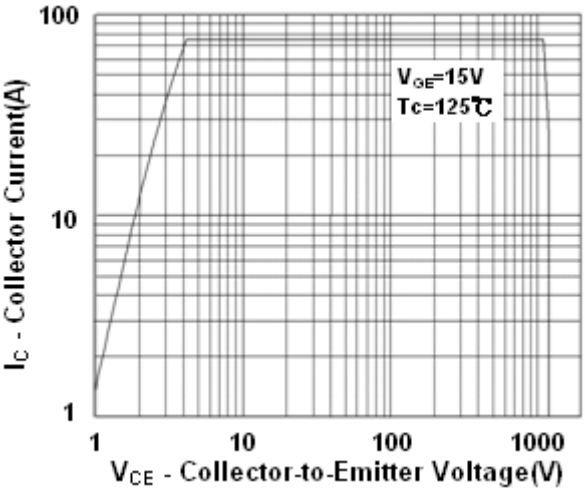
Gate charge characteristics



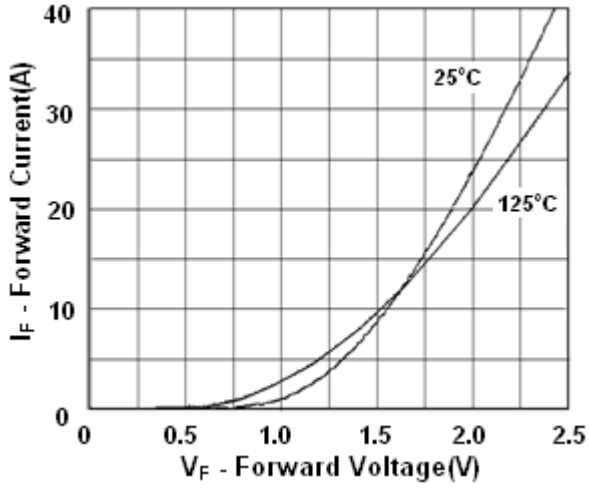
SOA Characteristics



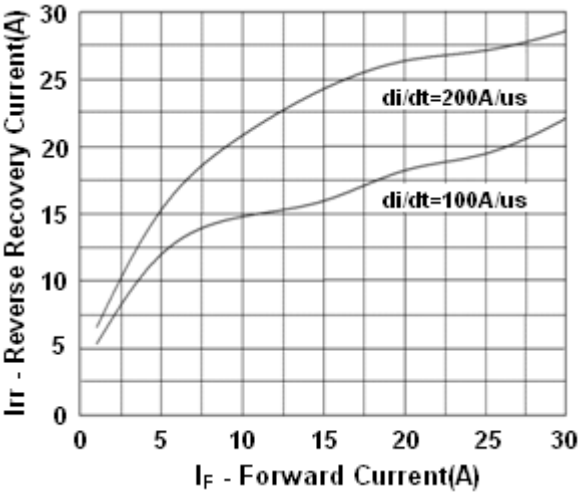
RBSOA



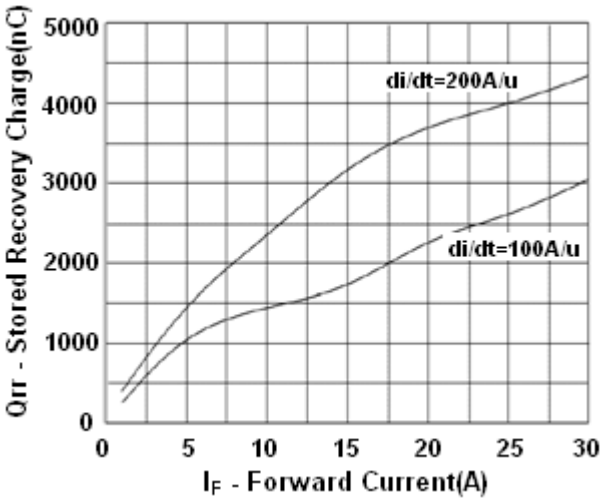
Conduction characteristics



Reverse recovery current vs. forward current

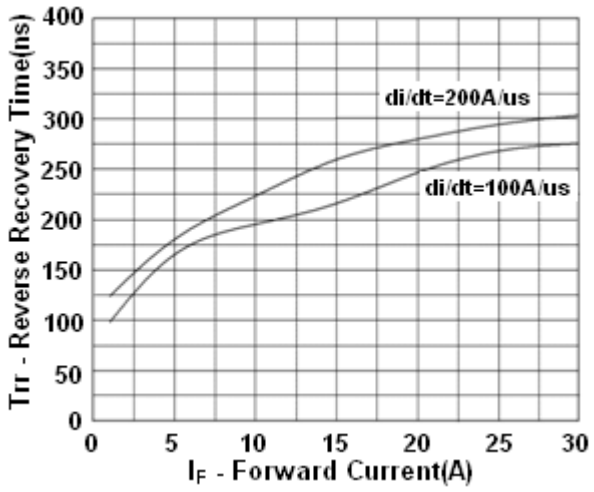


Stored recovery charge vs. forward current

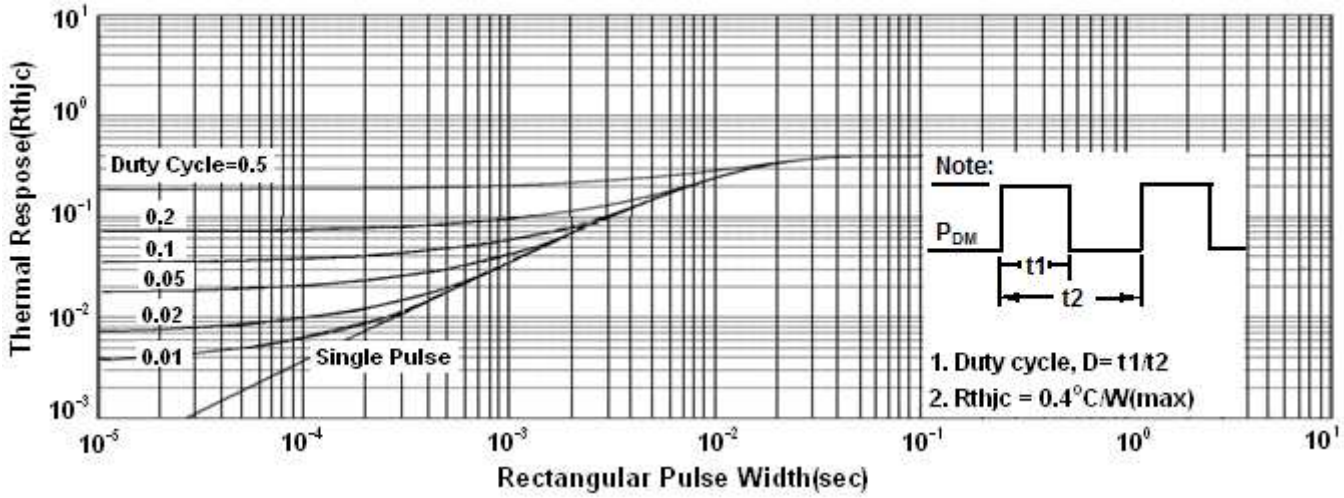


Electrical Characteristics Curve (Ta = 25°C, unless otherwise noted)

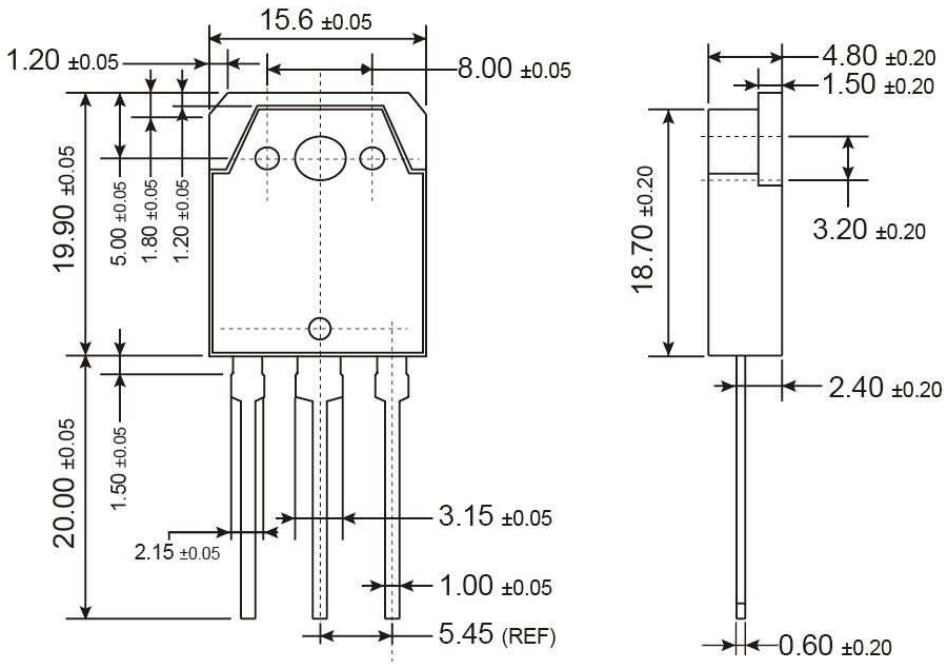
Reverse recovery time vs. forward current



Normalized Thermal Transient Impedance, Junction-to-Ambient



TO-3PN Mechanical Drawing



Unit: Millimeters

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