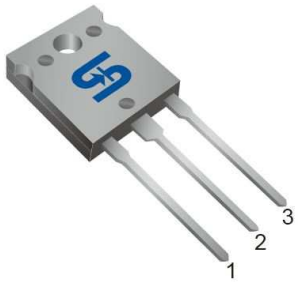
TAIWAN SEMICONDUCTOR

RoHS COMPLIANCE

TSG60N100CE

N-Channel IGBT with FRD.

TO-264



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

PRODUCT SUMMARY

V_{CES} (V)	V_{GES} (V)	I_C (A)
1000	±20	60

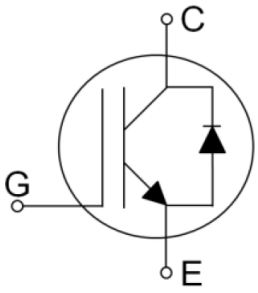
General Description

The TSG60N100CE using proprietary trench design and advanced NPT technology, the 1000V 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

- 1000V NPT Trench Technology
- High Speed Switching
- Low Conduction Loss

Block Diagram



NPT Trench IGBT

Ordering Information

Part No.	Package	Packing
TSG60N100CE C0	TO-264	25pcs / Tube

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

Parameter		Symbol	Limit	Unit
Collector-Emitter Voltage		V_{CES}	1000	V
Gate-Emitter Voltage		V_{GES}	±20	V
Continuous Current	T_C=25°C	I_C	60	A
	T_C=100°C		42	A
Pulsed Collector Current *		I_{CM}	200	A
Diode Continuous Forward Current (T_C=100℃)		I_F	15	A
Max Power Dissipation	T_J=25°C	P_D	208	W
	T_J=100°C		83	
Operating Junction Temperature		T_J	-55 to +150	°C
Storage Temperature Range		T_{STG}	-55 to +150	°C

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

TSG60N100CE

N-Channel IGBT with FRD.

Thermal Performance

Parameter		Symbol	Limit	Unit
Thermal Resistance - Junction to Case	IGBT	$R\Theta_{JC}$	0.6	°C/W
	DIODE		2.2	
Thermal Resistance - Junction to Ambient		$R\Theta_{JA}$	25	

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}	1000	--	--	V
Zero Gate Voltage Collector Current	V_{CE} = 1000V, 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 = 60mA	$V_{GE(TH)}$	3.5	5.5	7.5	V
Collector-Emitter Saturation Voltage	V_{GE} = 15V,I_C =60A, T_J=25ºC	$V_{CE(SAT)}$	--	2.1	2.5	V
	V_{GE} = 15V,I_C =60A, T_J=125ºC	$V_{CE(SAT)}$	--	2.6	--	V
Dynamic						
Input Capacitance	V_{CE} = 30V, V_{GE} = 0V, f = 1.0MHz	C_{IES}	--	5600	--	pF
Output Capacitance		C_{OES}	--	150	--	
Reverse Transfer Capacitance		C_{RES}	--	115	--	
Switching						
Turn-On Delay Time	V_{CC} = 600V, I_C = 60A, R_G = 10Ω, V_{GE} = 15V Inductive Load, T_J=25°C	$t_{d(on)}$	--	230	--	nS
Rise Time		t_r	--	210	--	
Turn-Off Delay Time		$t_{d(off)}$	--	1250	--	
Fall Time		t_f	--	120	230	
Turn-On Switching Loss		E_{on}	--	14.5	22	mJ
Turn-Off Switching Loss		E_{off}	--	7.0	11	
Total Switching Loss		E_{ts}	--	21.5	33	
Turn-On Delay Time	V_{CC} = 600V, I_C = 60A, R_G = 10Ω, V_{GE} = 15V Inductive Load, T_J=125°C	$t_{d(on)}$	--	210	--	nS
Rise Time		t_r	--	260	--	
Turn-Off Delay Time		$t_{d(off)}$	--	1350	--	
Fall Time		t_f	--	160	--	
Turn-On Switching Loss		E_{on}	--	16	24	mJ
Turn-Off Switching Loss		E_{off}	--	8.0	12	
Total Switching Loss		E_{ts}	--	24	36	
Total Gate Charge	V_{CC} = 600V, I_C = 60A, V_{GE} = 15V	Q_g	--	270	405	nC
Gate-Emitter Charge		Q_{ge}	--	45	68	
Gate-Collector Charge		Q_{gc}	--	100	150	

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

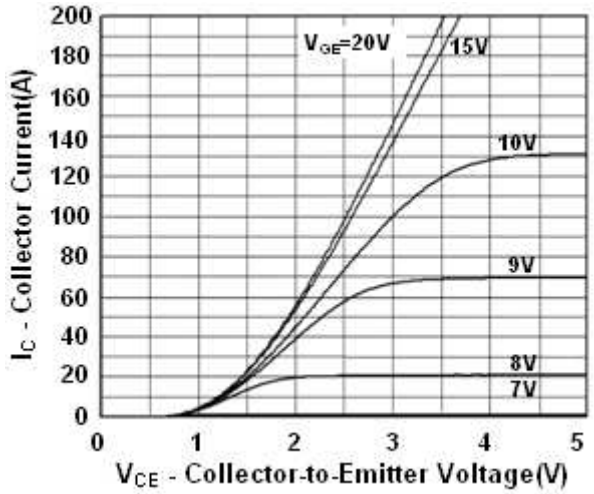
Parameter	Conditions		Symbol	Min	Typ	Max	Unit
Diode Forward Voltage	I_F = 60A,	T_J=25°C	V_{FM}	--	2.9	3.4	V
		T_J=125°C		--	3.3	--	V
Reverse Recovery Time	I_F = 60A, dl/dt=200A/us	T_J=25°C	t_{fr}	--	310	465	ns
		T_J=125°C		--	320	--	
Reverse Recovery Current		T_J=25°C	I_{fr}	--	34	51	A
		T_J=125°C		--	35	--	
Reverse Recovery Charge		T_J=25°C	Q_{fr}	--	5270	7900	nC
		T_J=125°C		--	5600	--	

TSG60N100CE

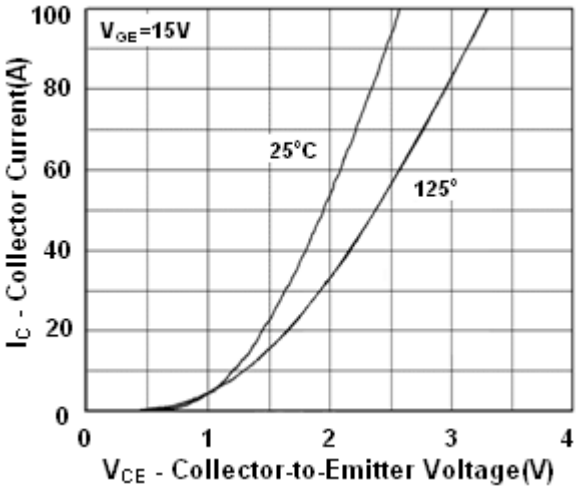
N-Channel IGBT with FRD.

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

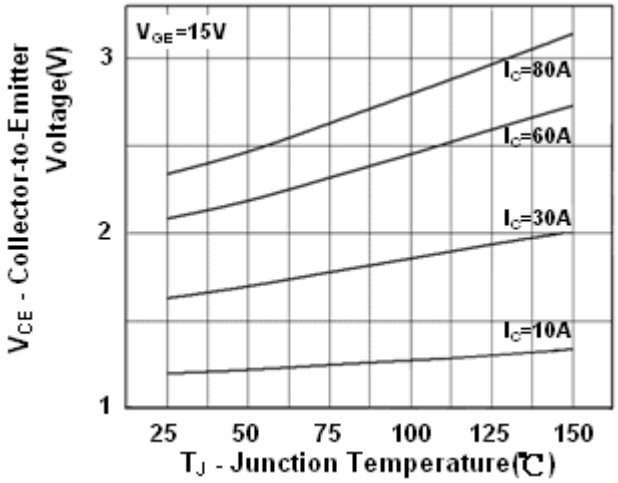
Output Characteristics



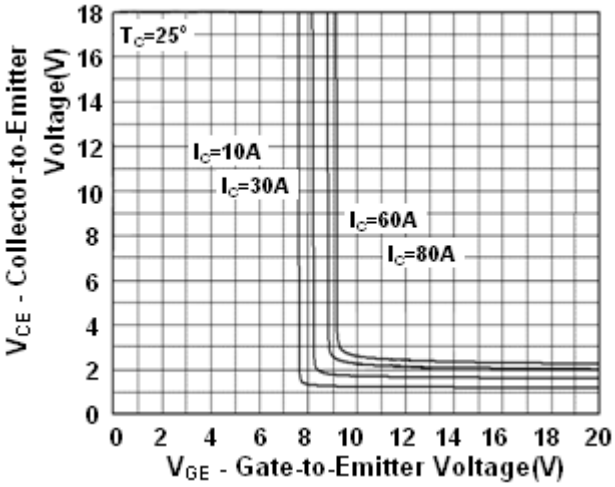
Saturation voltage characteristics



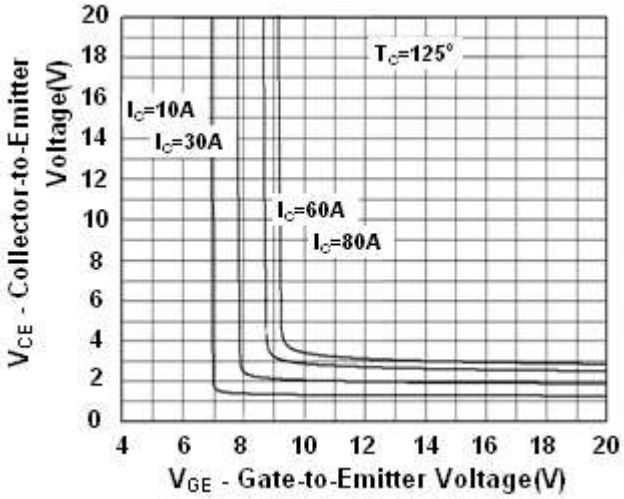
Saturation voltage vs. collector current



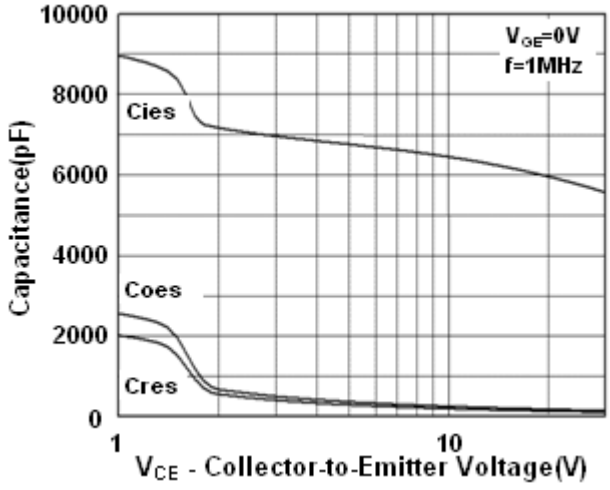
Saturation voltage vs. gate bias



Saturation voltage vs. gate bias



Capacitance characteristics

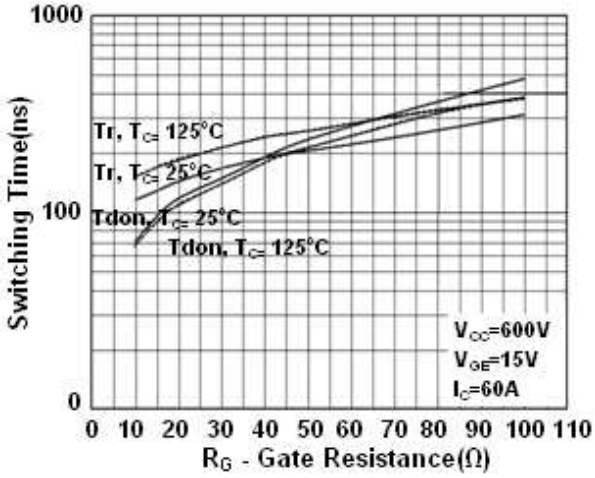


TSG60N100CE

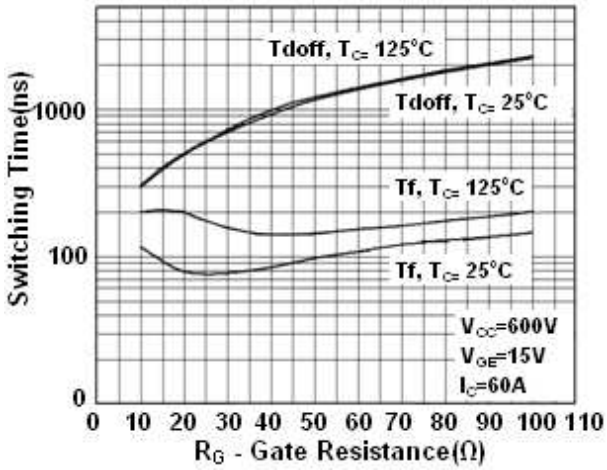
N-Channel IGBT with FRD.

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

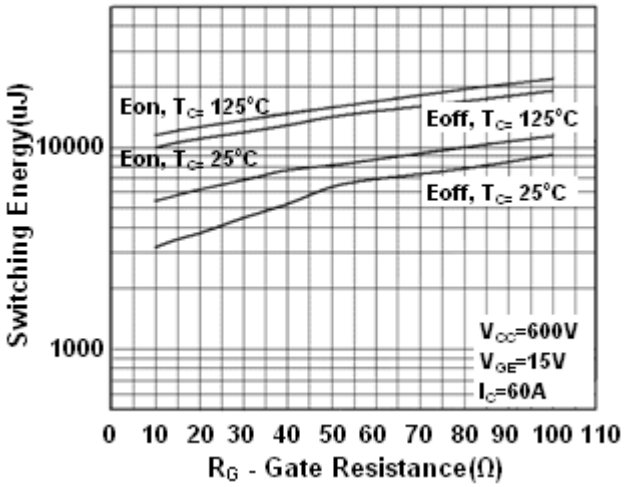
Turn on time vs. gate resistance



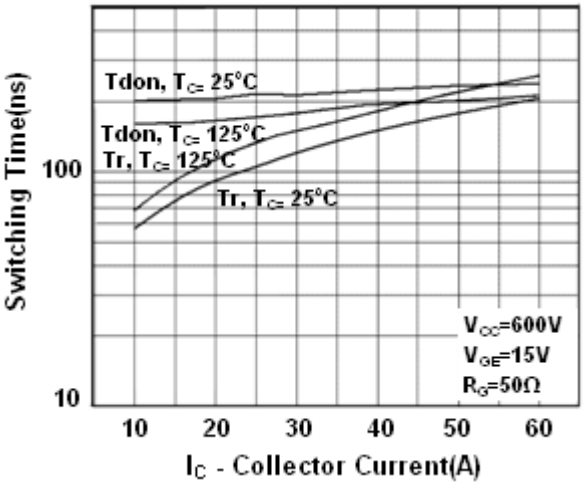
Turn off time vs. gate resistance



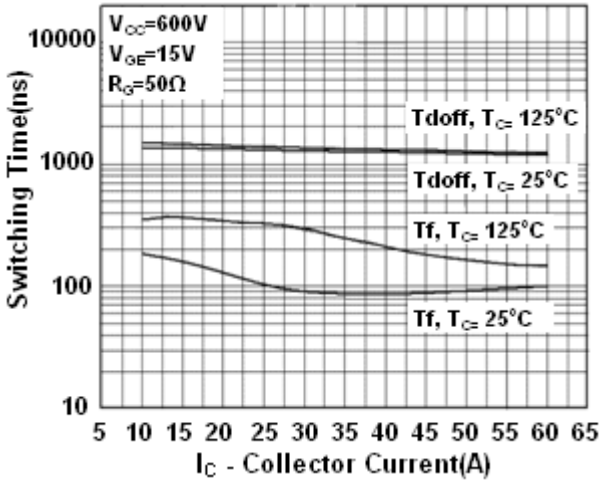
Switching loss vs. gate resistance



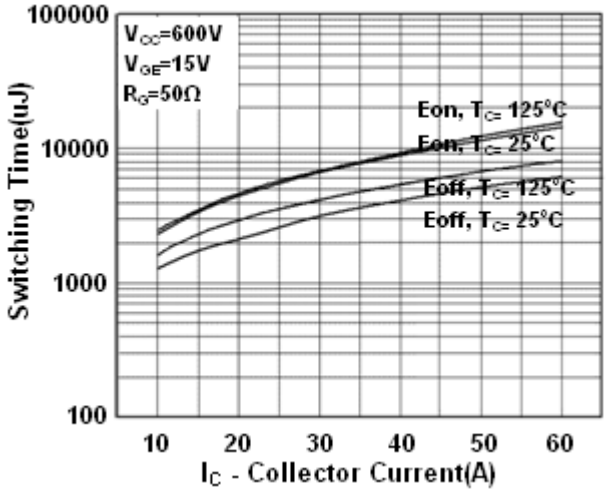
Turn on time vs. collector current



Turn off time vs. collector current



Switching loss vs. collector current

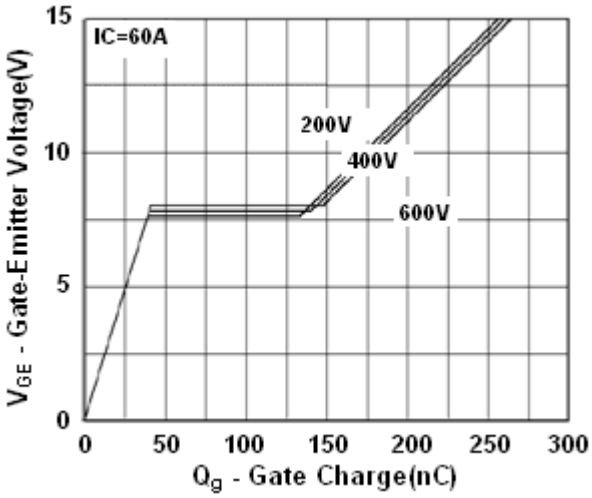


TSG60N100CE

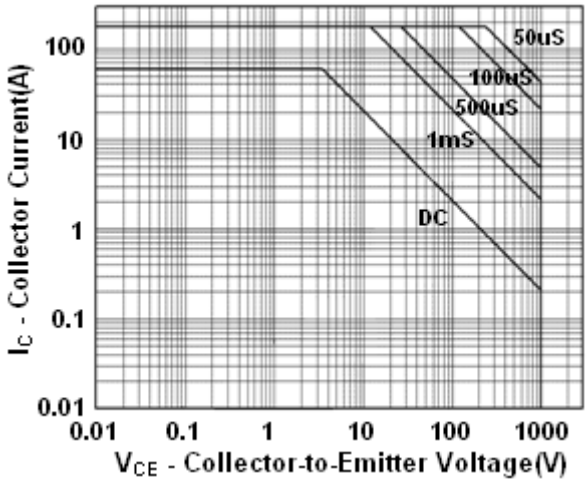
N-Channel IGBT with FRD.

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

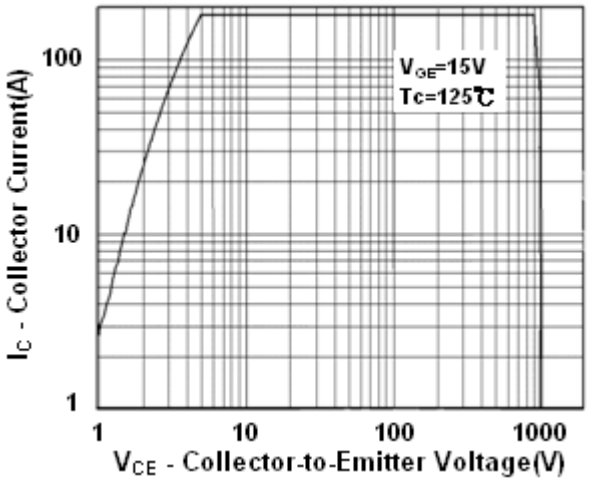
Gate charge characteristics



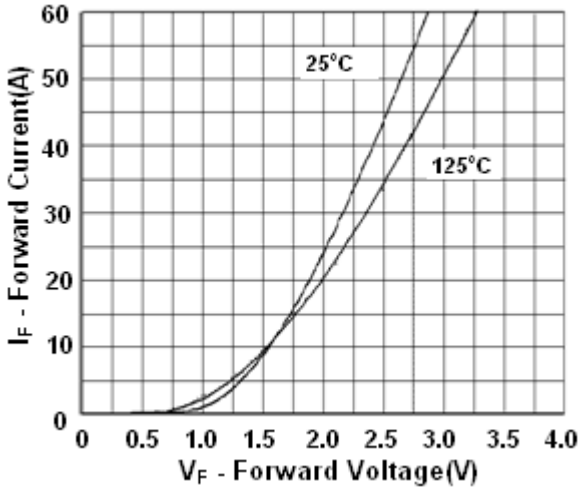
SOA Characteristics



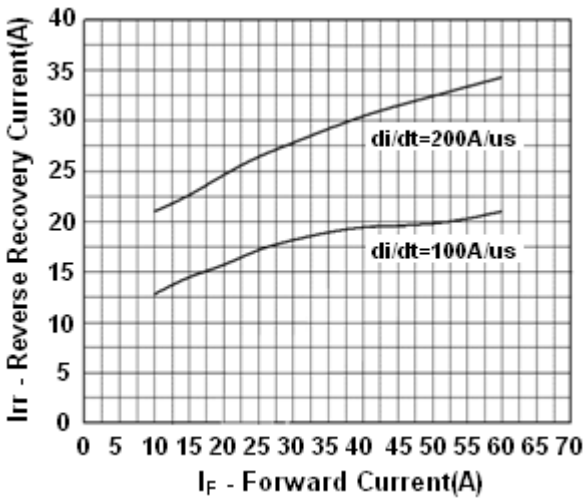
RBSOA



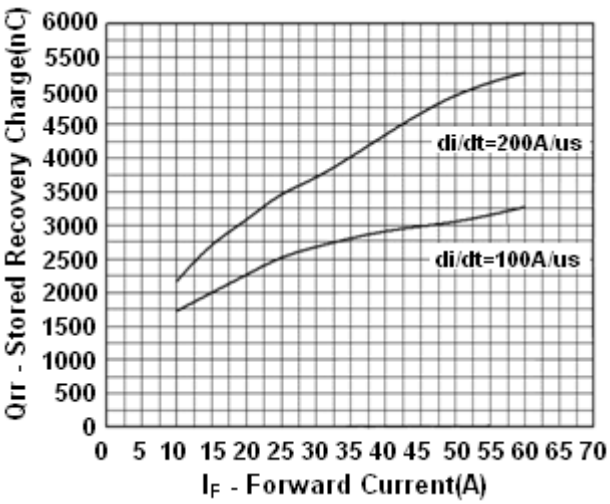
Conduction characteristics



Reverse recovery current vs. forward current

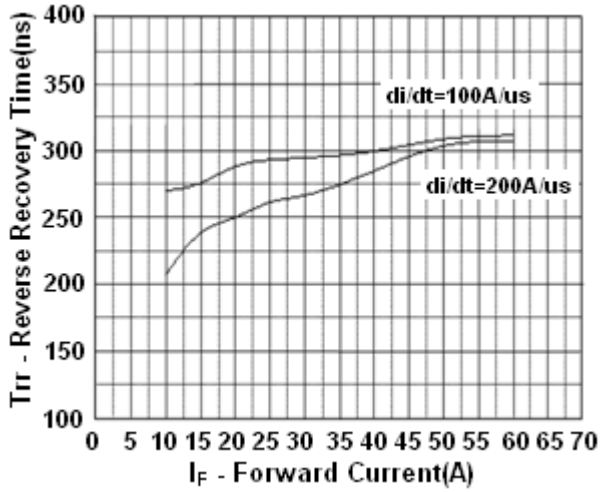


Stored recovery charge vs. forward current

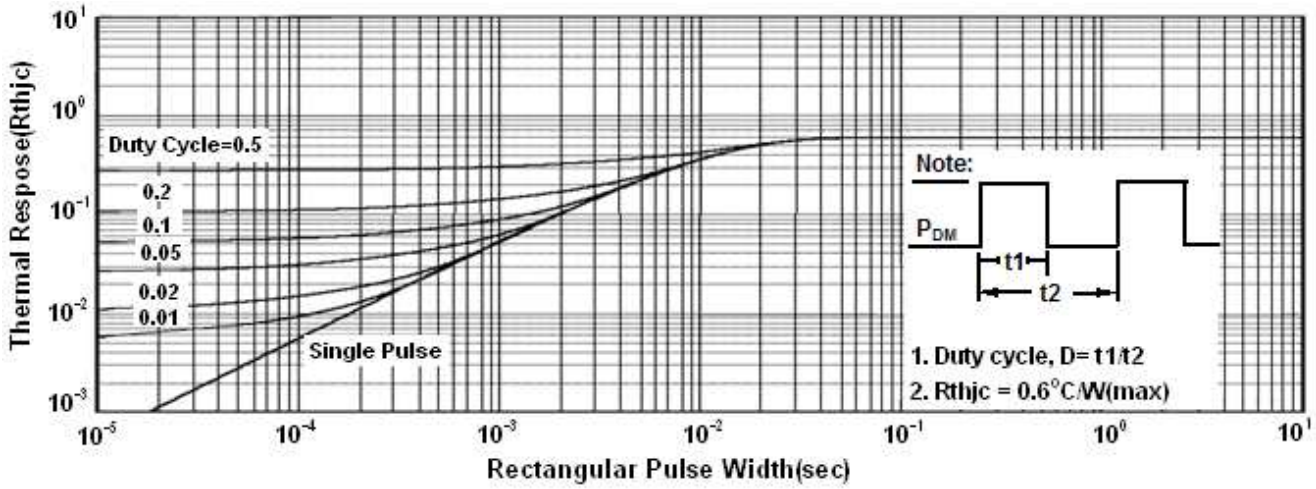


Electrical Characteristics Curve (Ta = 25°C, unless otherwise noted)

Reverse recovery time vs. forward current



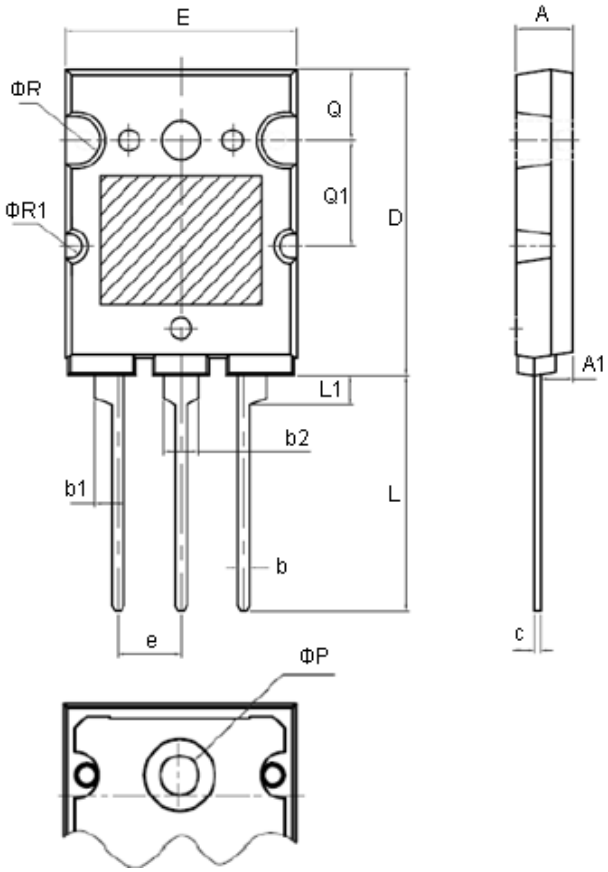
Normalized Thermal Transient Impedance, Junction-to-Ambient



TSG60N100CE

N-Channel IGBT with FRD.

TO-264 Mechanical Drawing



TO-264 DIMENSION						
DIM	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	4.8	5.0	5.2	0.189	0.197	0.205
A1	2.5	2.8	3.1	0.098	0.110	0.122
b	0.90	1.00	1.25	0.035	0.039	0.049
b1	2.3	2.5	2.7	0.091	0.098	0.106
b2	2.8	3.0	3.2	0.110	0.118	0.126
c	0.50	0.60	0.85	0.020	0.024	0.033
D	25.58	26.09	26.59	1.007	1.027	1.047
E	19.30	19.81	20.29	0.760	0.780	0.799
e	5.15	5.45	5.75	0.203	0.215	0.226
L	19.5	20.0	20.5	0.768	0.787	0.807
L1	2.4	2.5	2.6	0.094	0.098	0.102
ΦP	3.10	3.30	3.51	0.122	0.130	0.138
Q	5.8	6.0	6.2	0.228	0.236	0.244
Q1	8.8	9.0	9.2	0.346	0.354	0.362
ΦR	--	2.0	--	--	0.079	--
ΦR1	--	1.0	--	--	0.039	--

Notice

Specifications of the products displayed herein are subject to change without notice. TSC or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, to any intellectual property rights is granted by this document. Except as provided in TSC's terms and conditions of sale for such products, TSC assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of TSC products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify TSC for any damages resulting from such improper use or sale.