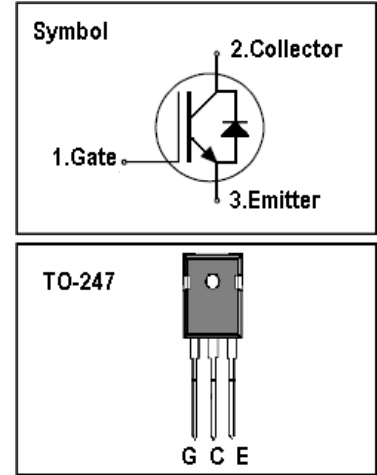


IGBT

Features

- 1200V,40A
- $V_{CE(sat)(typ.)}=2.1V@V_{GE}=15V,I_C=40A$
- High speed switching
- Higher system efficiency
- Soft current turn-off waveforms
- Internal insulation



General Description

JIAEN Trench IGBTs offer lower losses and higher energy efficiency for application such as IH (induction heating), UPS, general inverter and other soft switching applications.

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	± 30	V
I_C	Continuous Collector Current ($T_C=25^\circ C$)	80	A
	Continuous Collector Current ($T_C=100^\circ C$)	40	A
I_{CM}	Pulsed Collector Current (Note 1)	120	A
I_F	Diode Continuous Forward Current ($T_C=100^\circ C$)	40	A
I_{FM}	Diode Maximum Forward Current (Note 1)	120	A
t_{sc}	Short Circuit Withstand Time	10	us
P_D	Maximum Power Dissipation ($T_C=25^\circ C$)	300	W
	Maximum Power Dissipation ($T_C=100^\circ C$)	110	W
T_J	Operating Junction Temperature Range	-55 to +150	$^\circ C$
T_{STG}	Storage Temperature Range	-55 to +150	$^\circ C$

Thermal Characteristics

Symbol	Parameter	Max.	Units
$R_{th\ j-c}$	Thermal Resistance, Junction to case for IGBT	0.83	$^\circ C/W$
$R_{th\ j-c}$	Thermal Resistance, Junction to case for Diode	0.8	$^\circ C/W$
$R_{th\ j-a}$	Thermal Resistance, Junction to Ambient	40	$^\circ C/W$

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{CES}	Collector-Emitter Breakdown Voltage	$V_{GE}=0V, I_C=250\mu A$	1200	-	-	V
I_{CES}	Collector-Emitter Leakage Current	$V_{CE}=1200V, V_{GE}=0V$	-	-	100	μA
I_{GES}	Gate Leakage Current, Forward	$V_{GE}=30V, V_{CE}=0V$	-	-	100	nA
	Gate Leakage Current, Reverse	$V_{GE}=-30V, V_{CE}=0V$	-	-	100	nA
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE}=V_{CE}, I_C=250\mu A$	4.0	-	6.0	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$V_{GE}=15V, I_C=40A$	-	2.1		V
Q_g	Total Gate Charge	$V_{CC}=600V$ $V_{GE}=15V$ $I_C=40A$	-	107		nC
Q_{ge}	Gate-Emitter Charge		-	36		nC
Q_{gc}	Gate-Collector Charge		-	58		nC
$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V$ $V_{GE}=15V$ $I_C=40A$ $R_G=10\Omega$ Inductive Load $T_C=25^\circ\text{C}$	-	45	-	ns
t_r	Turn-on Rise Time		-	76	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	270	-	ns
t_f	Turn-off Fall Time		-	40	-	ns
E_{on}	Turn-on Switching Loss		-	4.5	-	mJ
E_{off}	Turn-off Switching Loss		-	2.5	-	mJ
E_{ts}	Total Switching Loss		-	7.0	-	mJ
C_{ies}	Input Capacitance	$V_{CE}=30V$ $V_{GE}=0V$ $f=1\text{MHz}$	-	3000	-	pF
C_{oes}	Output Capacitance		-	80	-	pF
C_{res}	Reverse Transfer Capacitance		-	30	-	pF

Electrical Characteristics of Diode ($T_C=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	$I_F=40A$	-	2.2	3.2	V
t_{rr}	Diode Reverse Recovery Time	$V_{CE}=600V$ $I_F=40A$	-	250		ns
I_{rr}	Diode peak Reverse Recovery Current		-	10		A
Q_{rr}	Diode Reverse Recovery Charge	$dI_F/dt=200A/\mu s$	-	1350		nC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature

Typical Performance Characteristics

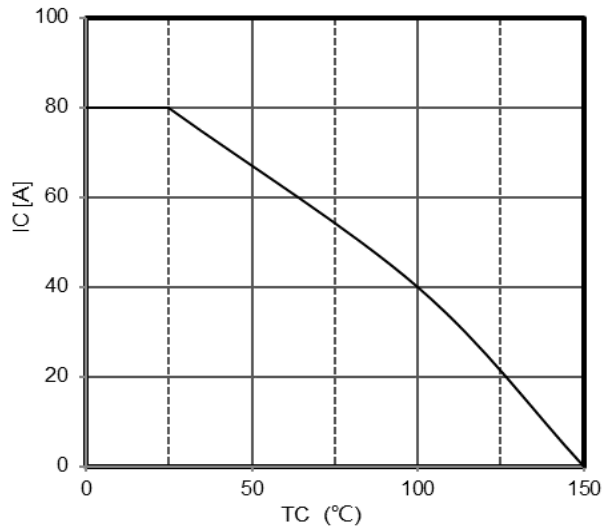


Figure1:maximum DC collector current
VS. case temperature

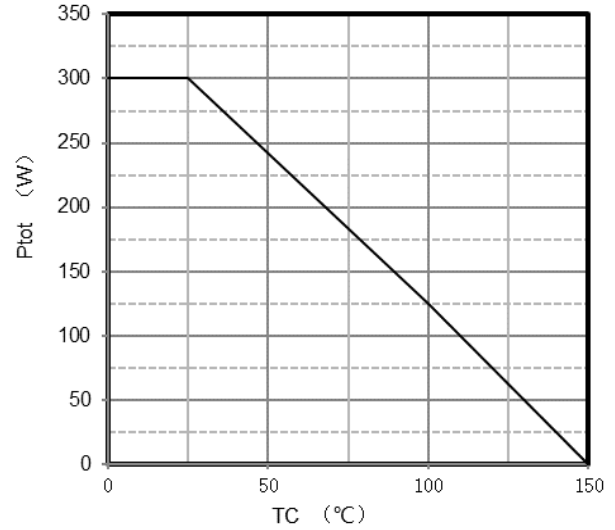


Figure2:power dissipation VS. case temprature

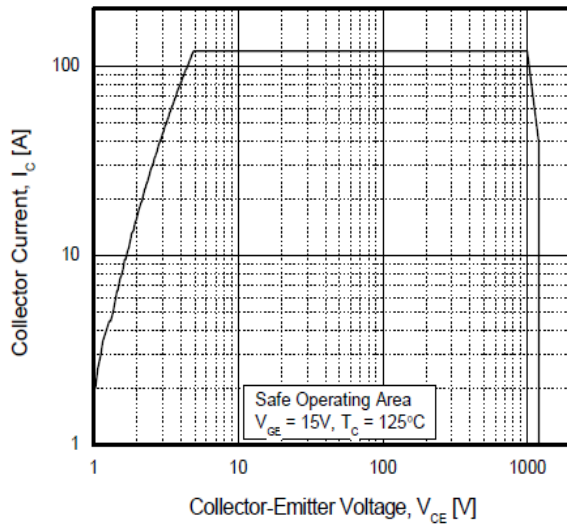


Figure3:reverse bias SOA, TJ=125°C, VGE=15V

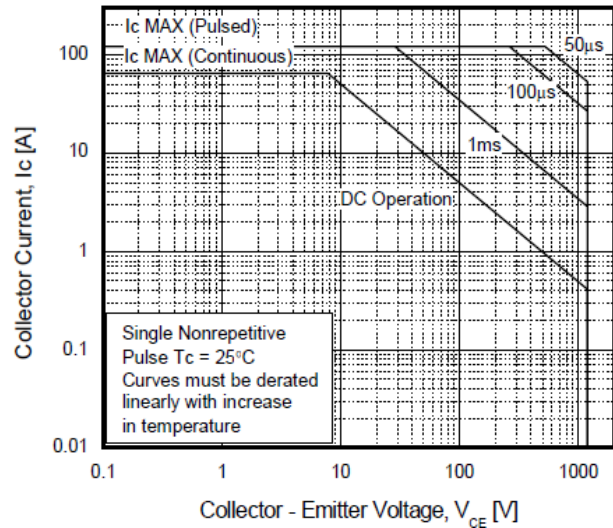


Figure4:forward SOA, TC=25°C, TJ≤150°C

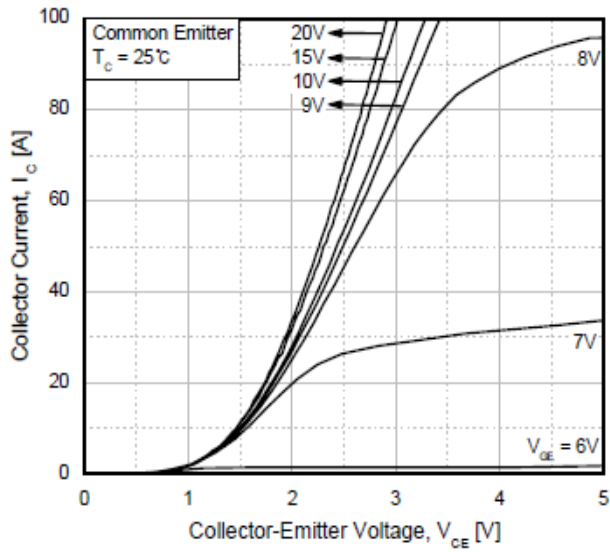


Figure5: typical IGBT output characteristics,
T_J=25°C; t_p=300us

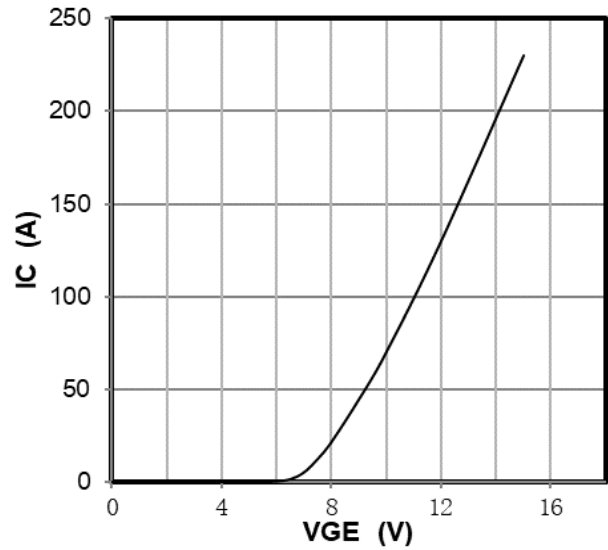


Figure6: typical trans characteristics,
V_{CE}=20V, t_p=20us

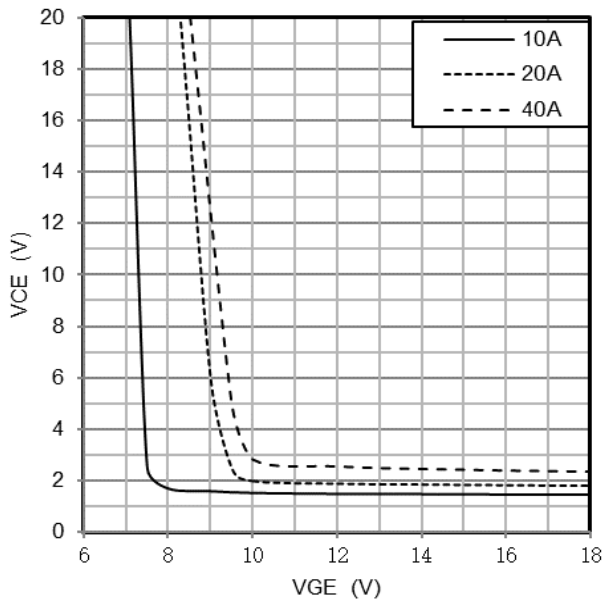


Figure7: typical V_{CE} VS. V_{GE}, T_J=25°C

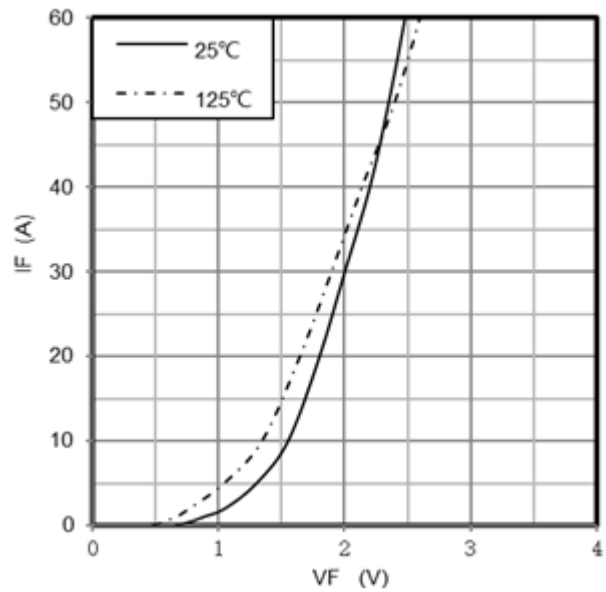


Figure8: typical diode forward characteristic, t_p=300us

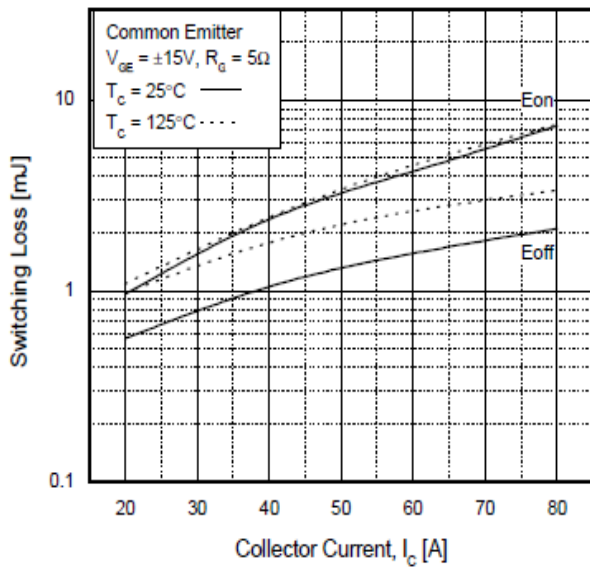


Figure9: typical energy loss VS. I_C , $T_C=25^{\circ}\text{C}$,
 $L=500\mu\text{H}$, $V_{CE}=600\text{V}$, $V_{GE}=15\text{V}$, $R_g=5\Omega$

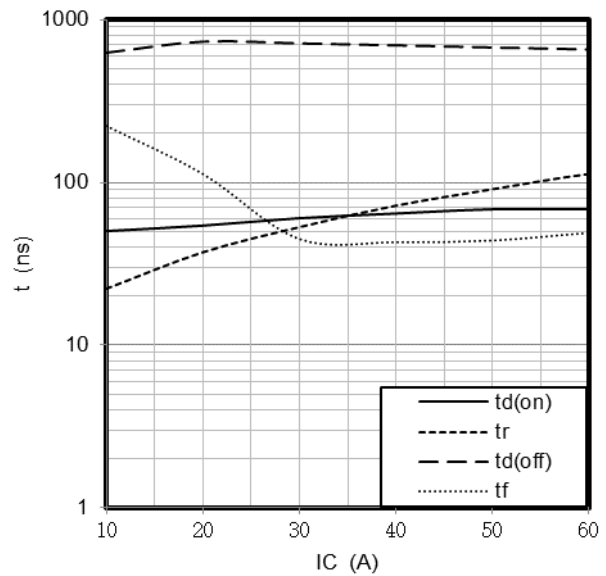


Figure10: typical switching time VS. I_C , $T_C=25^{\circ}\text{C}$,
 $L=500\mu\text{H}$, $V_{CE}=600\text{V}$, $V_{GE}=15\text{V}$, $R_g=28\Omega$

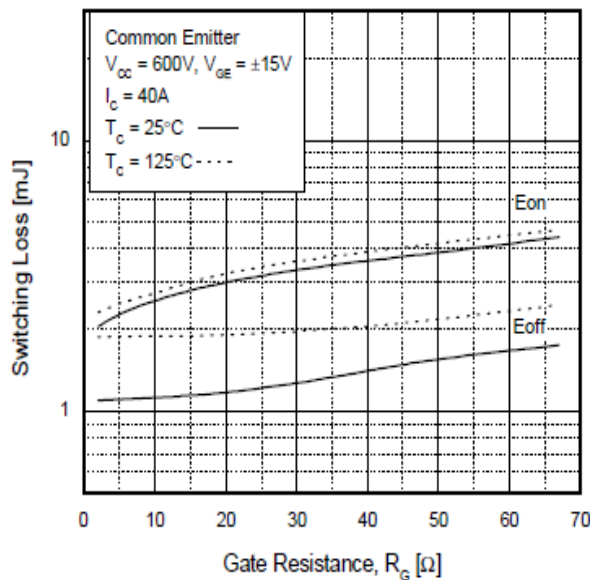


Figure11: typical energy loss VS. R_g , $T_C=25^{\circ}\text{C}$,
 $L=500\mu\text{H}$, $V_{CE}=600\text{V}$, $V_{GE}=15\text{V}$, $I_C=40\text{A}$

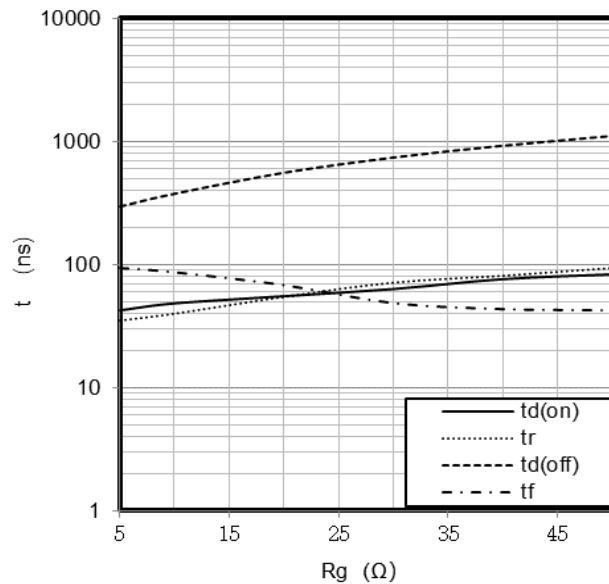


Figure12: typical switching time VS. R_g , $T_C=25^{\circ}\text{C}$,
 $L=500\mu\text{H}$, $V_{CE}=600\text{V}$, $V_{GE}=15\text{V}$, $I_C=20\text{A}$

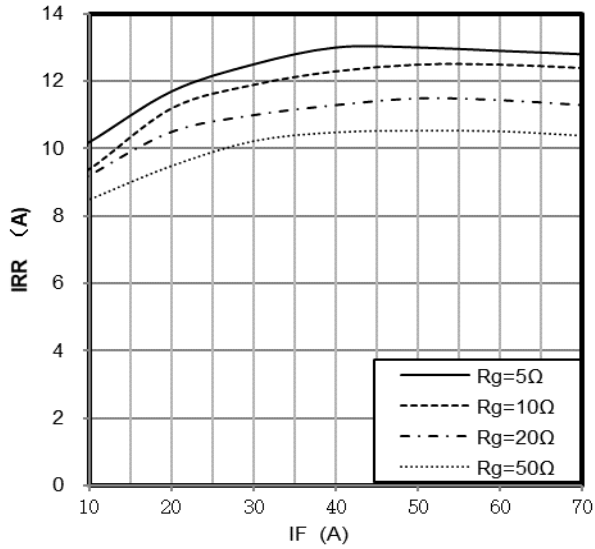


Figure13: typical diode IRR VS. IF, TC=25°C
VCC=600V, VGE=15V

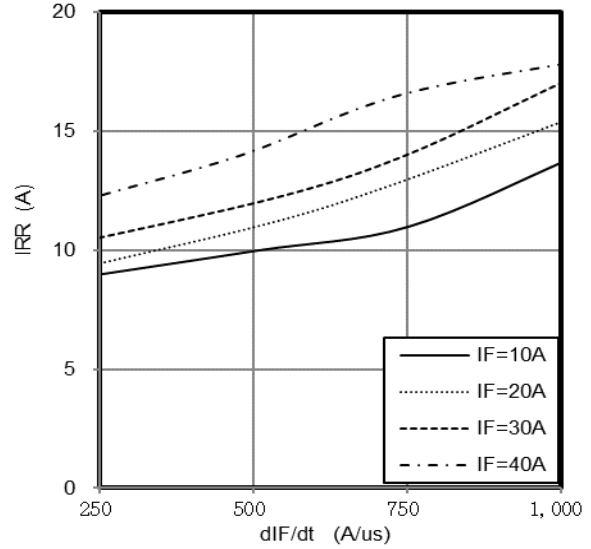


Figure14: typical diode IRR VS. dIF/dt
VCC=600V, VGE=15V

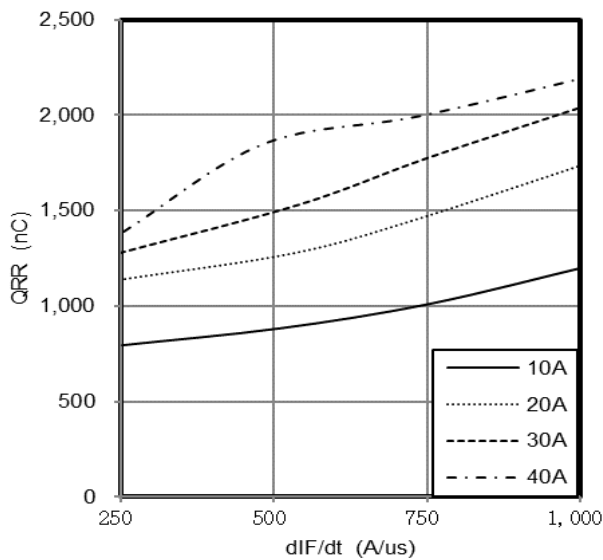


Figure15: typical diode QRR VS. dIF/dt
VCC=600V, VGE=15V

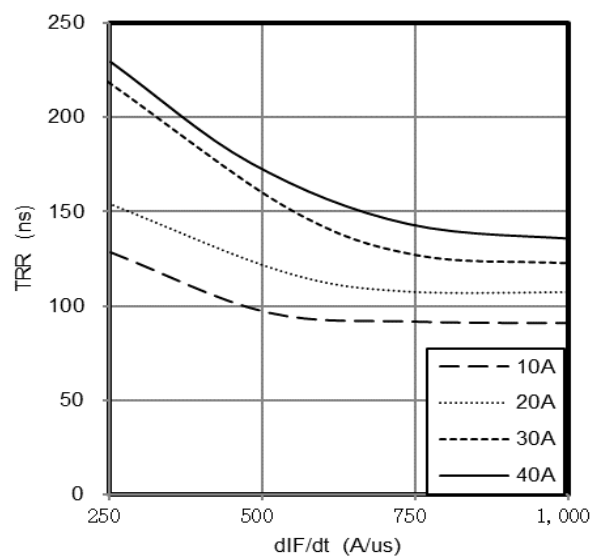


Figure16: typical diode TRR VS. dIF/dt,
VCC=600V, VGE=15V

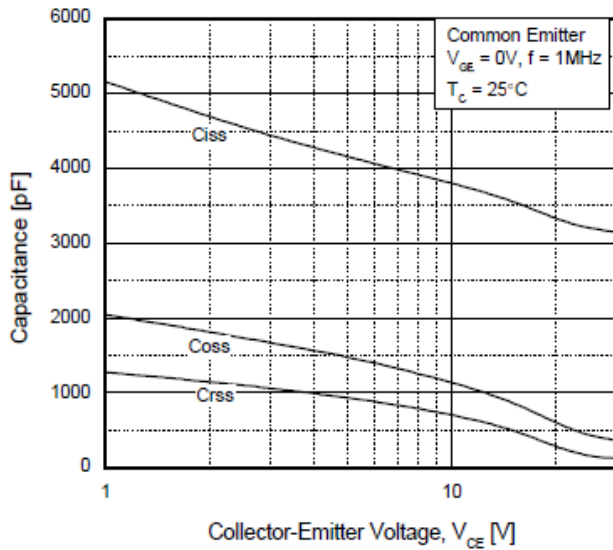


Figure17: typical capacitance VS. VCE,
 $V_{GE}=0V, f=100kHz$

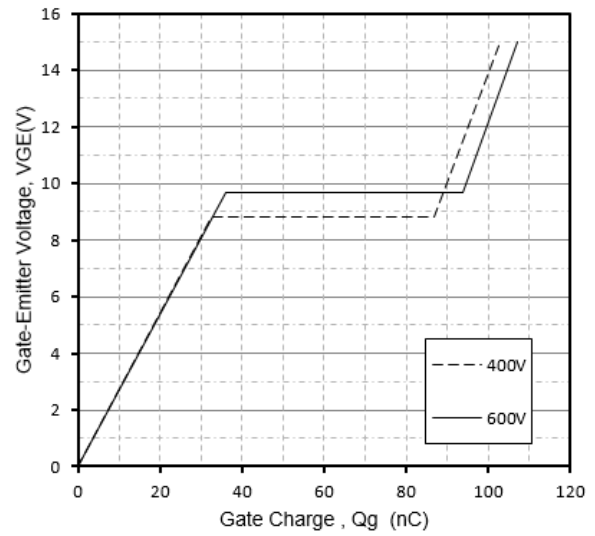


Figure18: typical gate charge VS. VGE, $I_C=40A$

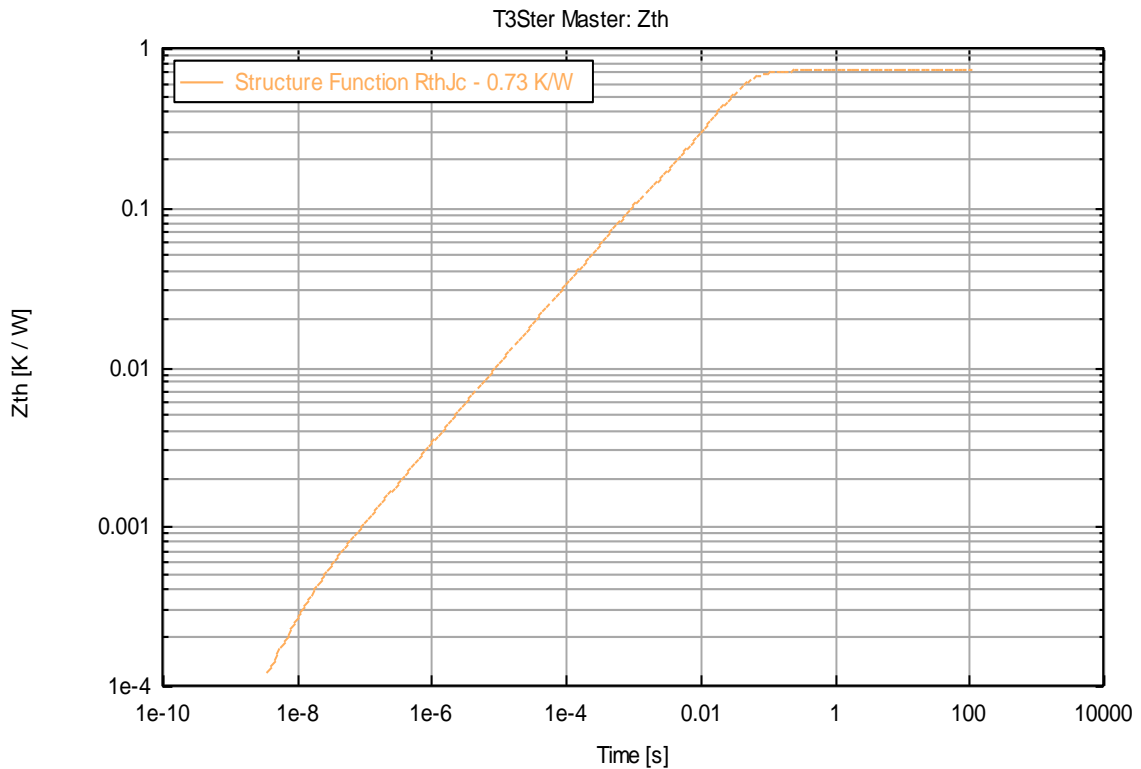
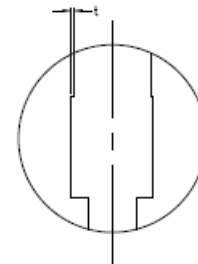
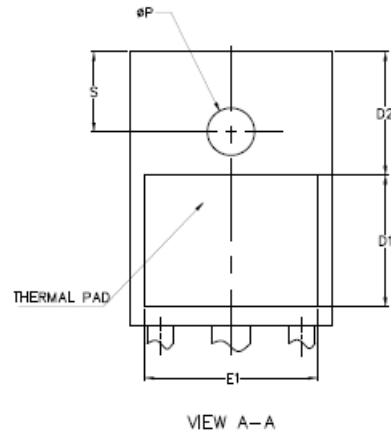
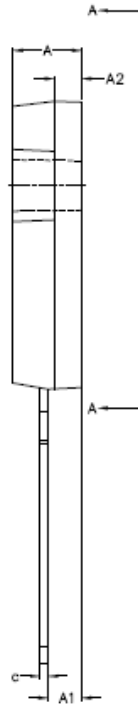
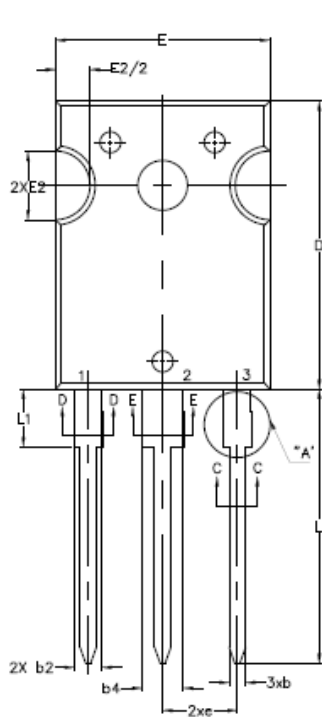
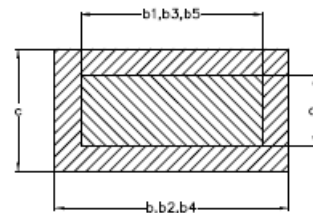
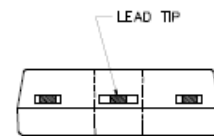


Figure19: normalized transient thermal impedance, junction-to-case

TO247II PACKAGE OUTLINE



DETAIL: "A"



SECTION C-C, D-D, E-E

SYMBOL	DIMENSIONS			
	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A	4.90	5.10	0.193	0.201
A1	2.31	2.51	0.091	0.099
A2	1.90	2.10	0.075	0.083
b	1.16	1.26	0.046	0.050
b1	1.15	1.22	0.045	0.048
b2	1.96	2.06	0.077	0.081
b3	1.95	2.02	0.077	0.080
b4	2.96	3.06	0.117	0.120
b5	2.95	3.02	0.116	0.119
c	0.59	0.66	0.023	0.026
c1	0.58	0.62	0.023	0.024
D	20.90	21.10	0.823	0.831
D1	10.10		0.398	
D2	9.32	9.62	0.367	0.379
E	15.75	15.90	0.620	0.626
E1	13.3BSC		0.524BSC	
E2	4.90	5.10	0.193	0.201
e	5.44BSC		0.214BSC	
L	19.80	20.10	0.780	0.791
L1	—	4.30	—	0.169
øP	3.50	3.70	0.138	0.146
S	6.05	6.25	0.238	0.246
t	0.00	0.15	0.000	0.006

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