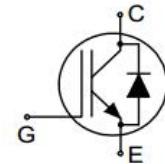




IGBT

Features

- 650V,25A
- $V_{CE(sat)(typ.)}=2.1V$ @ $V_{GE}=15V$, $I_c=25A$
- High speed switching
- Higher system efficiency
- Soft current turn-off waveforms
- Square RBSOA



General Description

JIAEN Trench IGBTs offer lower losses and higher energy efficiency for application such as Motor control, general inverter and other soft switching applications.

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
V_{CES}	Collector-Emitter Voltage	650	V
V_{GES}	Gate-Emitter Voltage	± 30	V
I_c	Continuous Collector Current ($T_c=25\text{ }^\circ\text{C}$)	50	A
	Continuous Collector Current ($T_c=100\text{ }^\circ\text{C}$)	25	A
I_{CM}	Pulsed Collector Current (Note 1)	75	A
I_F	Diode Continuous Forward Current ($T_c=100\text{ }^\circ\text{C}$)	25	A
I_{FM}	Diode Maximum Forward Current (Note 1)	75	A
t_{sc}	Short Circuit Withstand Time	10	us
P_D	Maximum Power Dissipation ($T_c=25\text{ }^\circ\text{C}$)	41.7	W
	Maximum Power Dissipation ($T_c=100\text{ }^\circ\text{C}$)	16.7	W
T_J	Operating Junction Temperature Range	-55 to +150	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-55 to +150	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Max.	Units
$R_{th\ j-c}$	Thermal Resistance, Junction to case for IGBT	3.0	$^\circ\text{C}/\text{W}$
$R_{th\ j-c}$	Thermal Resistance, Junction to case for Diode	2.9	$^\circ\text{C}/\text{W}$
$R_{th\ j-a}$	Thermal Resistance, Junction to Ambient	62.5	$^\circ\text{C}/\text{W}$



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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV _{CES}	Collector-Emitter Breakdown Voltage	V _{GE} = 0V, I _C = 250uA	650	-	-	V
I _{CES}	Collector-Emitter Leakage Current	V _{CE} = 650V, V _{GE} = 0V	-	-	100	uA
I _{GES}	Gate Leakage Current, Forward	V _{GE} =±20V, V _{CE} = 0V	-	-	±100	nA
V _{GE(th)}	Gate Threshold Voltage	V _{GE} = V _{CE} , I _C = 250uA	5.1	-	6.9	V
V _{CE(sat)}	Collector-Emitter Saturation Voltage	V _{GE} =15V, I _C = 25A	-	2.1	2.7	V
Q _g	Total Gate Charge	V _{CC} =480V V _{GE} =15V I _C =25A	-	31.2		nC
Q _{ge}	Gate-Emitter Charge		-	7.7		nC
Q _{gc}	Gate-Collector Charge		-	13.3		nC
t _{d(on)}	Turn-on Delay Time	V _{CC} =400V V _{GE} =15V I _C =25A R _G =15Ω Inductive Load T _C =25°C	-	22	-	ns
t _r	Turn-on Rise Time		-	44	-	ns
t _{d(off)}	Turn-off Delay Time		-	75	-	ns
t _f	Turn-off Fall Time		-	88	-	ns
E _{on}	Turn-on Switching Loss		-	0.66	-	mJ
E _{off}	Turn-off Switching Loss		-	0.49	-	mJ
E _{ts}	Total Switching Loss		-	1.15	-	mJ
C _{ies}	Input Capacitance	V _{CE} =25V V _{GE} =0V f = 1MHz	-	978	-	pF
C _{oes}	Output Capacitance		-	90	-	pF
C _{res}	Reverse Transfer Capacitance		-	8	-	pF

Electrical Characteristics of Diode (T_C=25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V _F	Diode Forward Voltage	I _F =25A	-	1.65	3.0	V
t _{rr}	Diode Reverse Recovery Time	V _{CE} = 400V I _F = 25A R _G =15Ω	-	60		ns
I _{rr}	Diode peak Reverse Recovery Current		-	15.6		A
Q _{rr}	Diode Reverse Recovery Charge		-	518		nC

Notes:

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



Typical Performance Characteristics

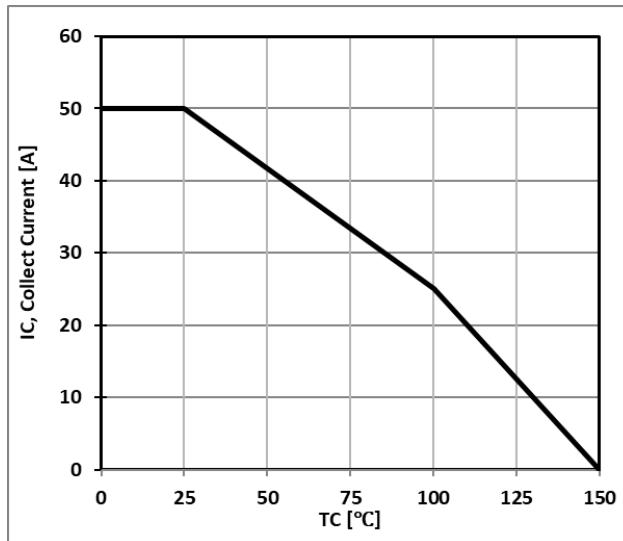


Figure 1: Maximum DC Collector Current
VS. case temperature

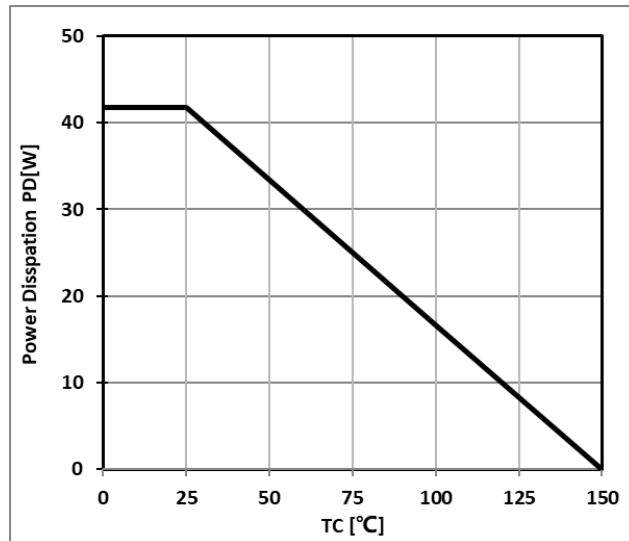


Figure 2: Power Dissipation VS. Case Temperature

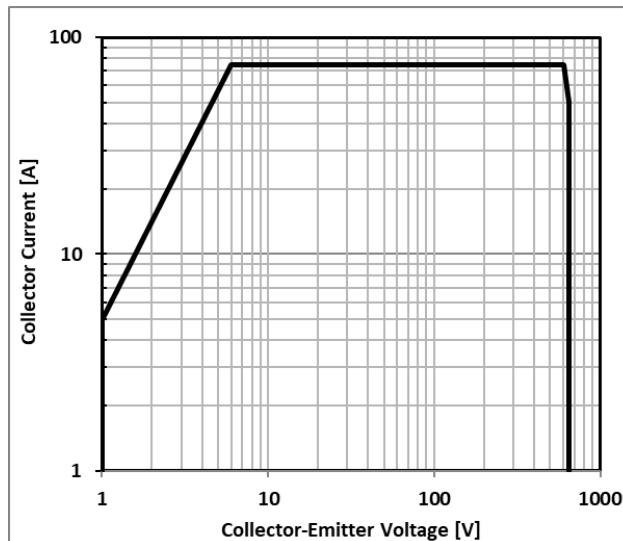


Figure 3: Reverse Bias SOA, $T_J=125^{\circ}\text{C}$, $VGE=15\text{V}$

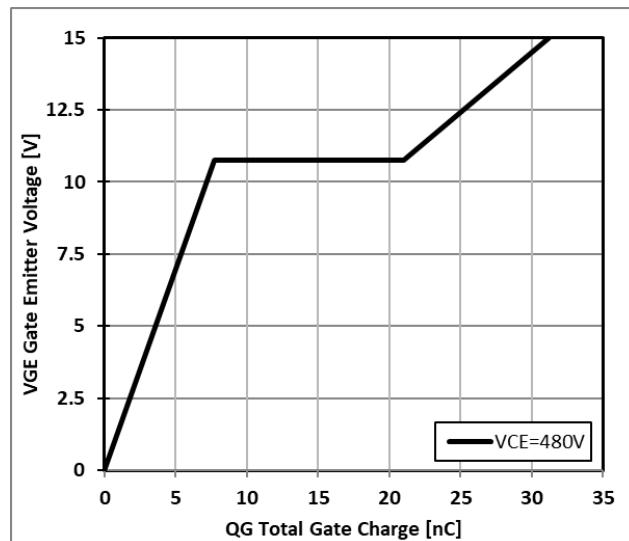
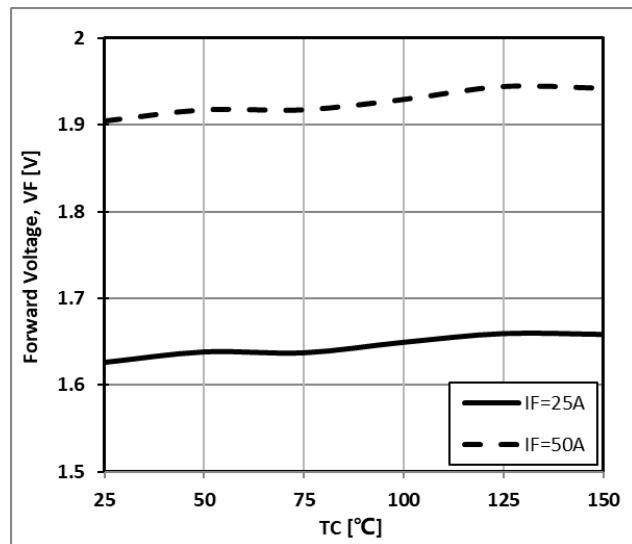
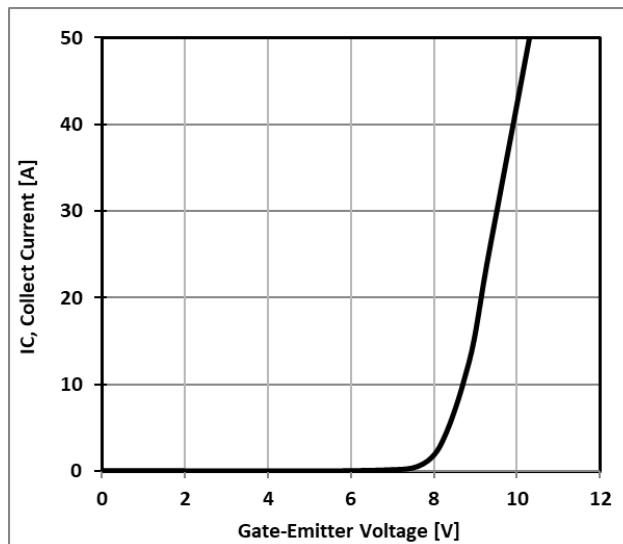
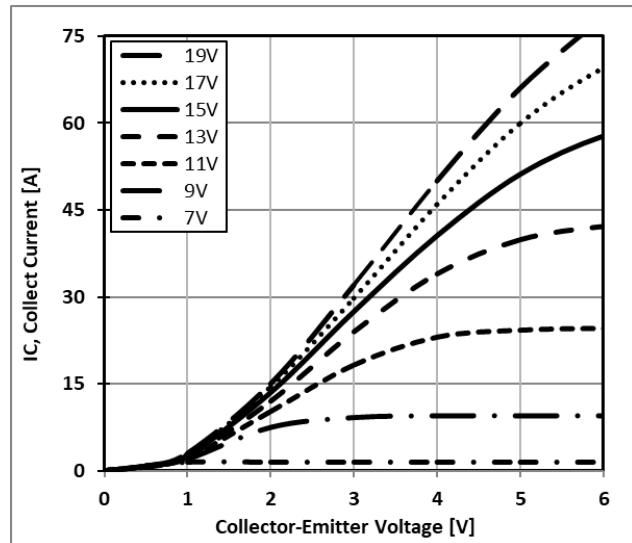
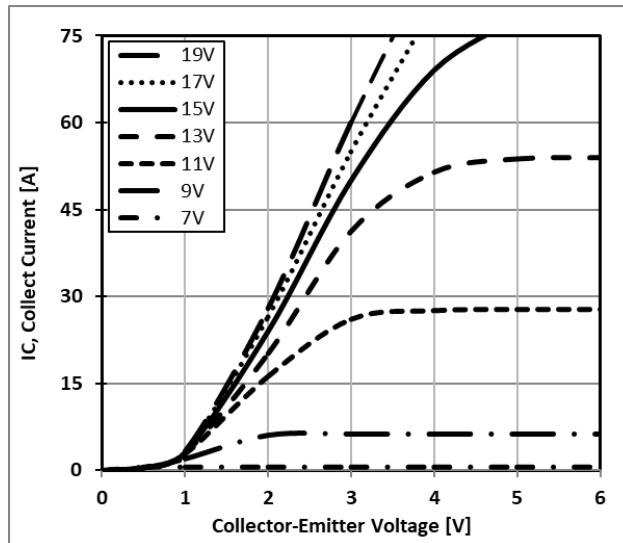


Figure 4: Typical Gate charge VS. VGE, $IC=25\text{A}$



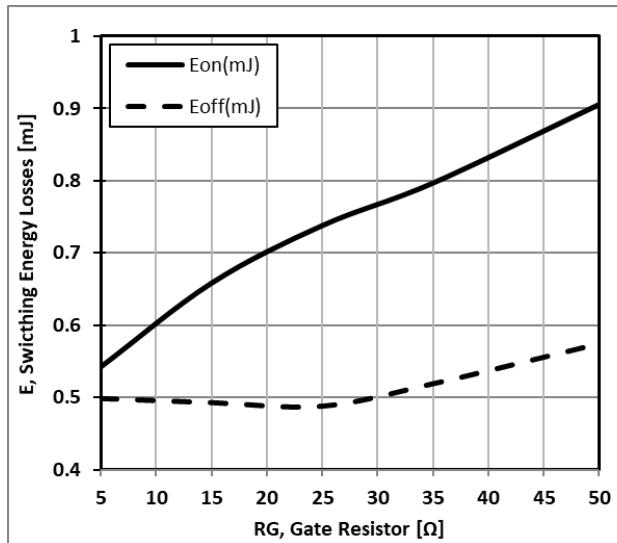


Figure 9: Typical Energy Loss VS. RG, TC=25°C,
L=200uH, VCE=400V, VGE=15V, IC=25A

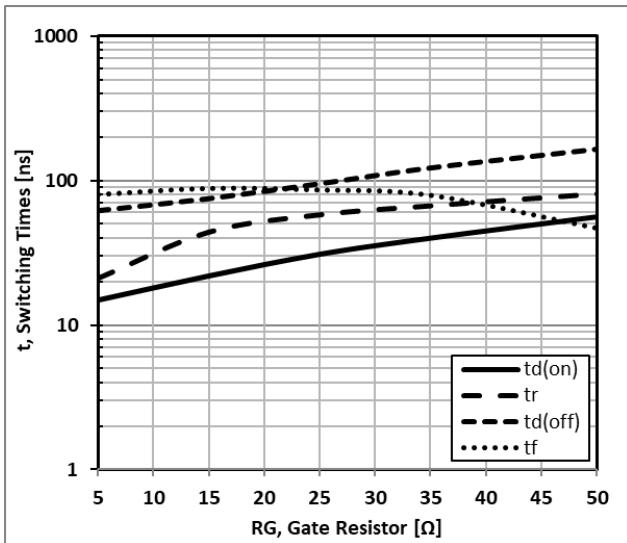


Figure 10: Typical Switching Time VS. RG, TC=25°C,
L=200uH, VCE=400V, VGE=15V, IC=25A

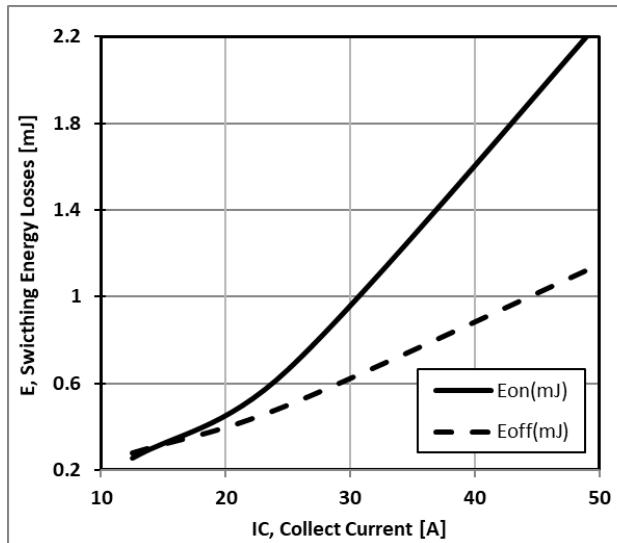


Figure 11: Typical Energy Loss VS. IC, TC=25°C,
L=200uH, VCE=400V, VGE=15V, RG=15Ω

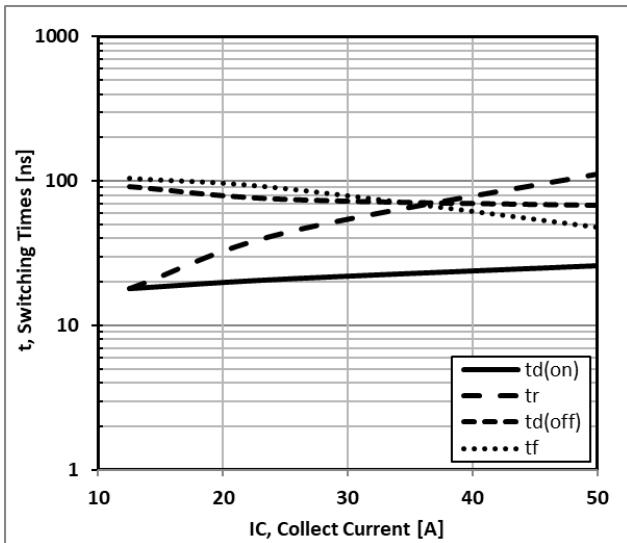
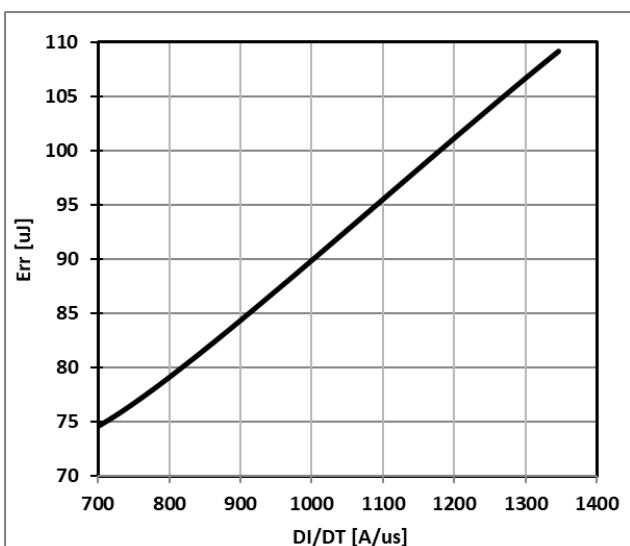
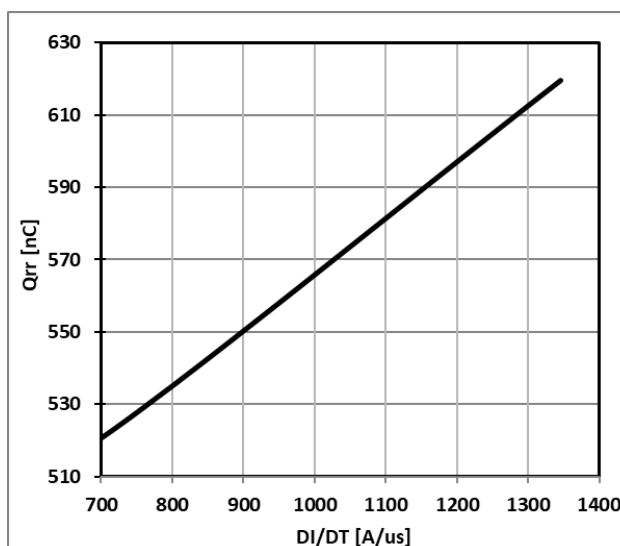
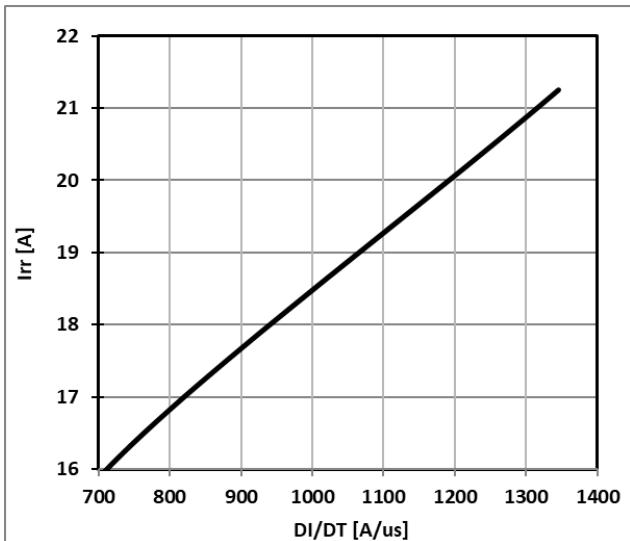
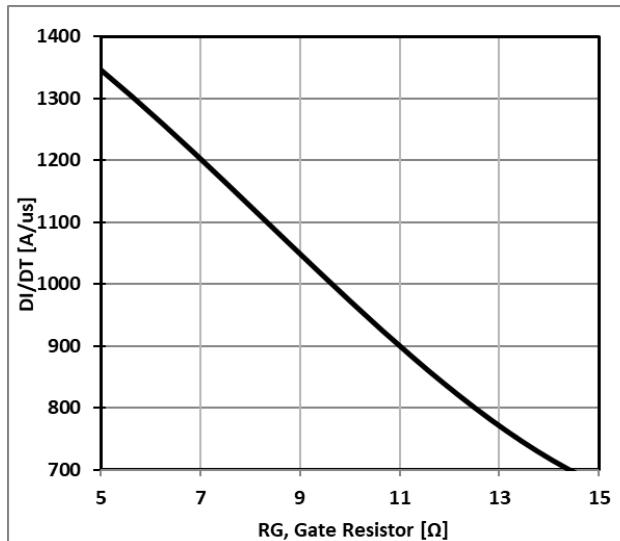


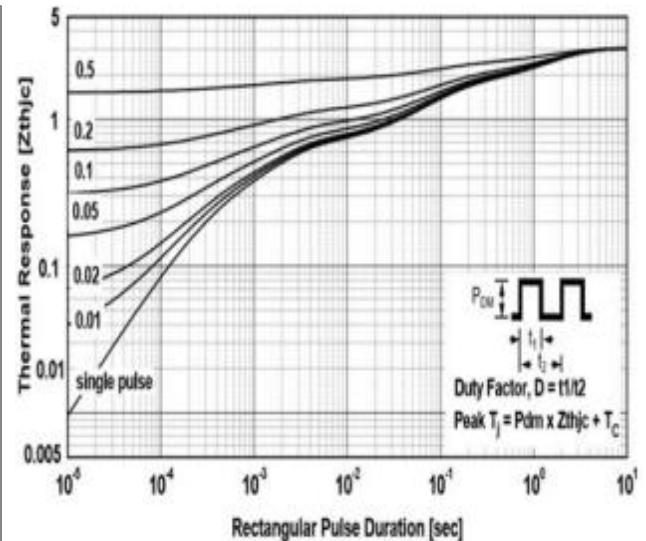
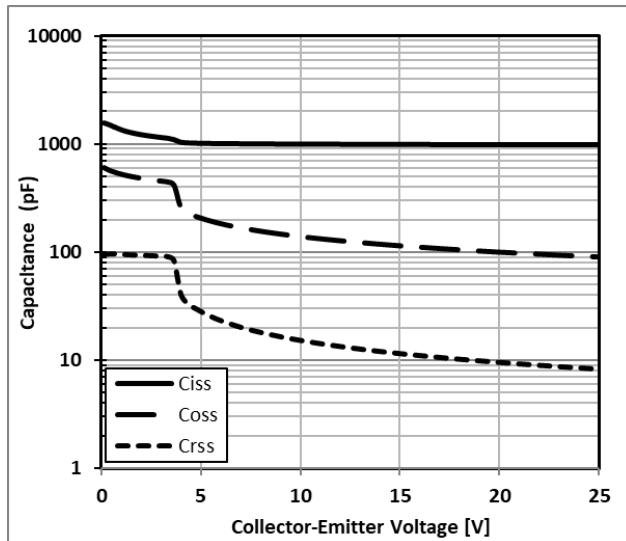
Figure 12: Typical Switching Time VS. IC, TC=25°C,
L=200uH, VCE=400V, VGE=15V, RG=15Ω





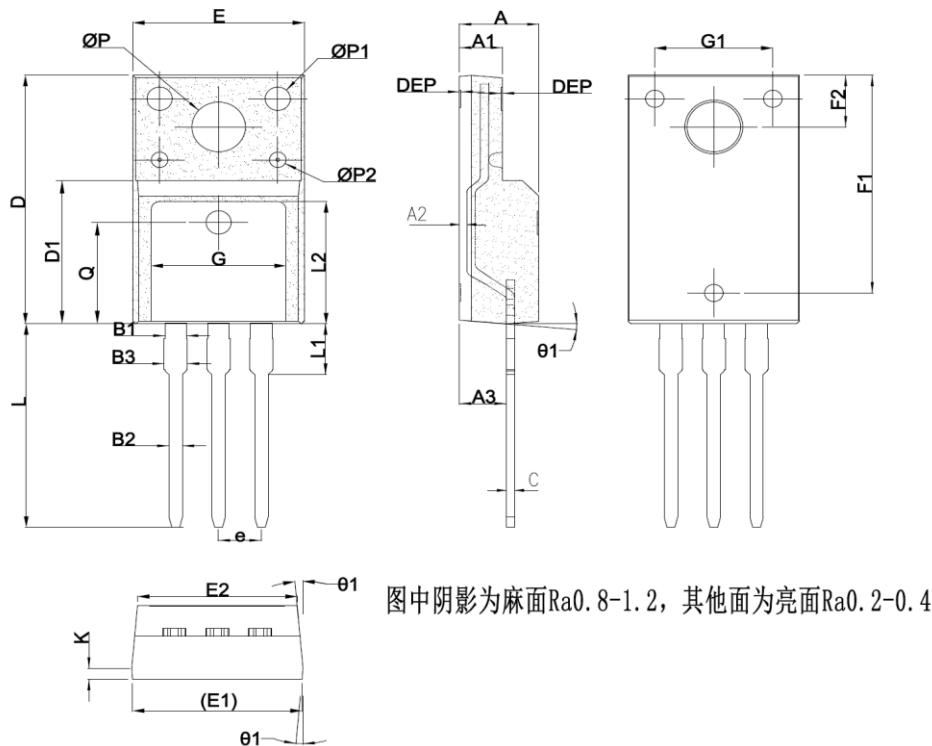
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TO-220F PACKAGE OUTLINE



SYMBOL	COMMON DIMENSIONS			
	mm	MIN	NOM	MAX
*A	4.50	4.70	4.90	
*A1	2.34	2.54	2.74	
*A2	0.38	0.43	0.48	
*A3	2.66	2.76	2.86	
B1	1.23	1.28	1.33	
*B2	0.75	0.80	0.85	
*B3	1.28	—	1.43	
*C	0.45	0.50	0.60	
*D	15.67	15.87	16.07	
*D1	9.04	9.12	9.20	
*e	2.49	2.54	2.59	
*E	10.00	10.16	10.32	
E1	9.94	10.04	10.14	
E2	9.36	9.46	9.56	
F1	13.80	13.90	14.00	
*F2	3.20	3.30	3.40	
G	7.80	8.00	8.20	
G1	6.90	7.00	7.10	
K	0.65	0.70	0.75	
*L	12.78	12.98	13.18	
*L1	3.13	3.23	3.33	
L2	7.70	7.80	7.90	
Q	6.5REF			
*ØP	3.08	—	3.48	
ØP1	1.40	1.50	1.60	
ØP2	0.95	1.00	1.05	
*Ø1	3°	5°	7°	
DEP	0.05	0.10	0.15	



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