

Insulated Gate Bipolar Transistor

General Description:

Using DongHai's proprietary Planar design and advanced FS technology, the 650V FS IGBT offers superior conduction and switching performances, high avalanche ruggedness and easy parallel operation.

Features:

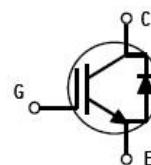
- FS Trench Technology, Positive temperature coefficient
- Low saturation voltage: $V_{CE(sat)}$, typ = 1.85V
@ $I_C = 60A$ and $T_C = 25^\circ C$
- Extremely enhanced avalanche capability

Applications:

Aircondition、Welding、UPS...

V_{CES}	650	V
I_C	60	A
P_{tot} ($T_C=25^\circ C$)	406	W
$V_{CE(sat)}$	1.85	V

TO-247 PACKAGE



Absolute Maximum Ratings ($T_C = 25^\circ C$ unless otherwise specified) :

Symbol	Parameter	Rating	Units
V_{CES}	Collector-Emitter Voltage	650	V
V_{GES}	Gate- Emitter Voltage	± 20	V
I_C	Collector Current	120	A
	Collector Current @ $T_C = 100^\circ C$	60	
I_{CM}^{a1}	Pulsed Collector Current	180	A
I_F	Diode Continuous Forward Current @ $T_C = 100^\circ C$	30	A
I_{FM}	Diode Maximum Forward Current	90	A
P_D	Power Dissipation @ $T_C = 25^\circ C$	406	W
	Power Dissipation @ $T_C = 100^\circ C$	163	
T_J	operating junction temperature range	150	$^\circ C$
T_{stg}	Storage Temperature Range	$-55 \sim 150$	$^\circ C$
T_L	Maximum Temperature for Soldering	270	$^\circ C$

a1: The pulse width is limited by the maximum junction temperature

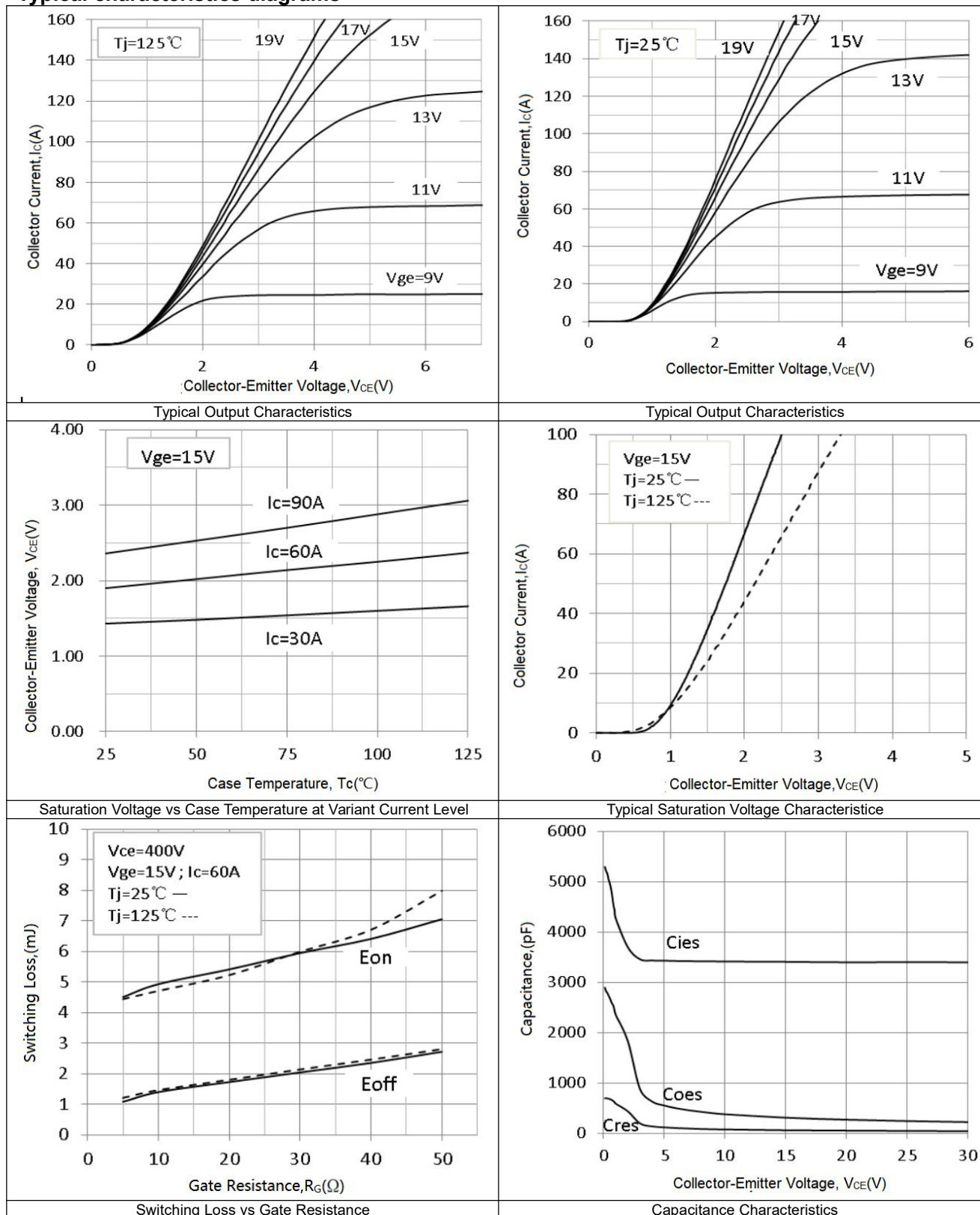
Thermal Characteristics

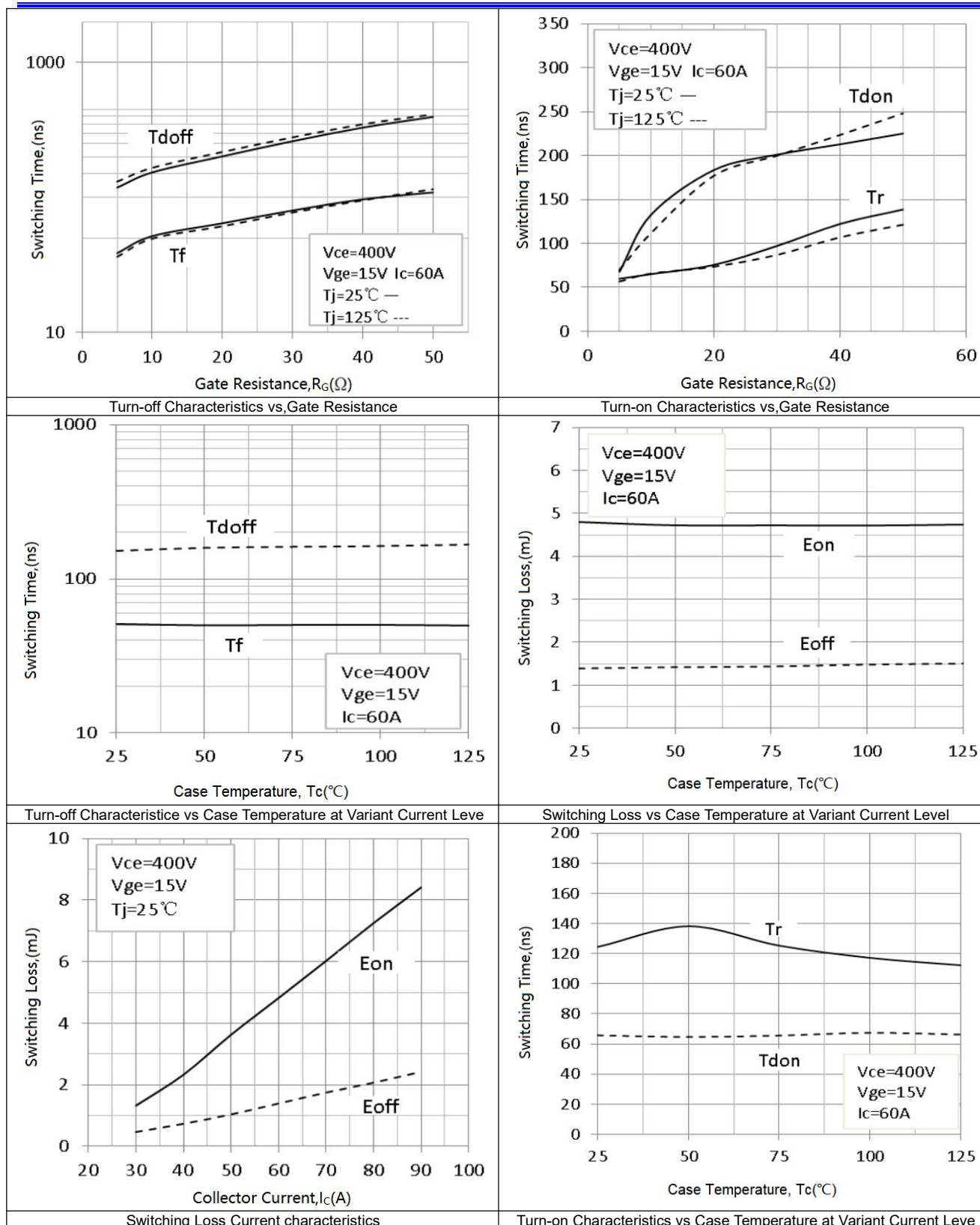
Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Thermal Resistance, Junction to case for IGBT	--	0.446	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance, Junction to case for Diode	--	1.25	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	--	40	$^\circ C/W$

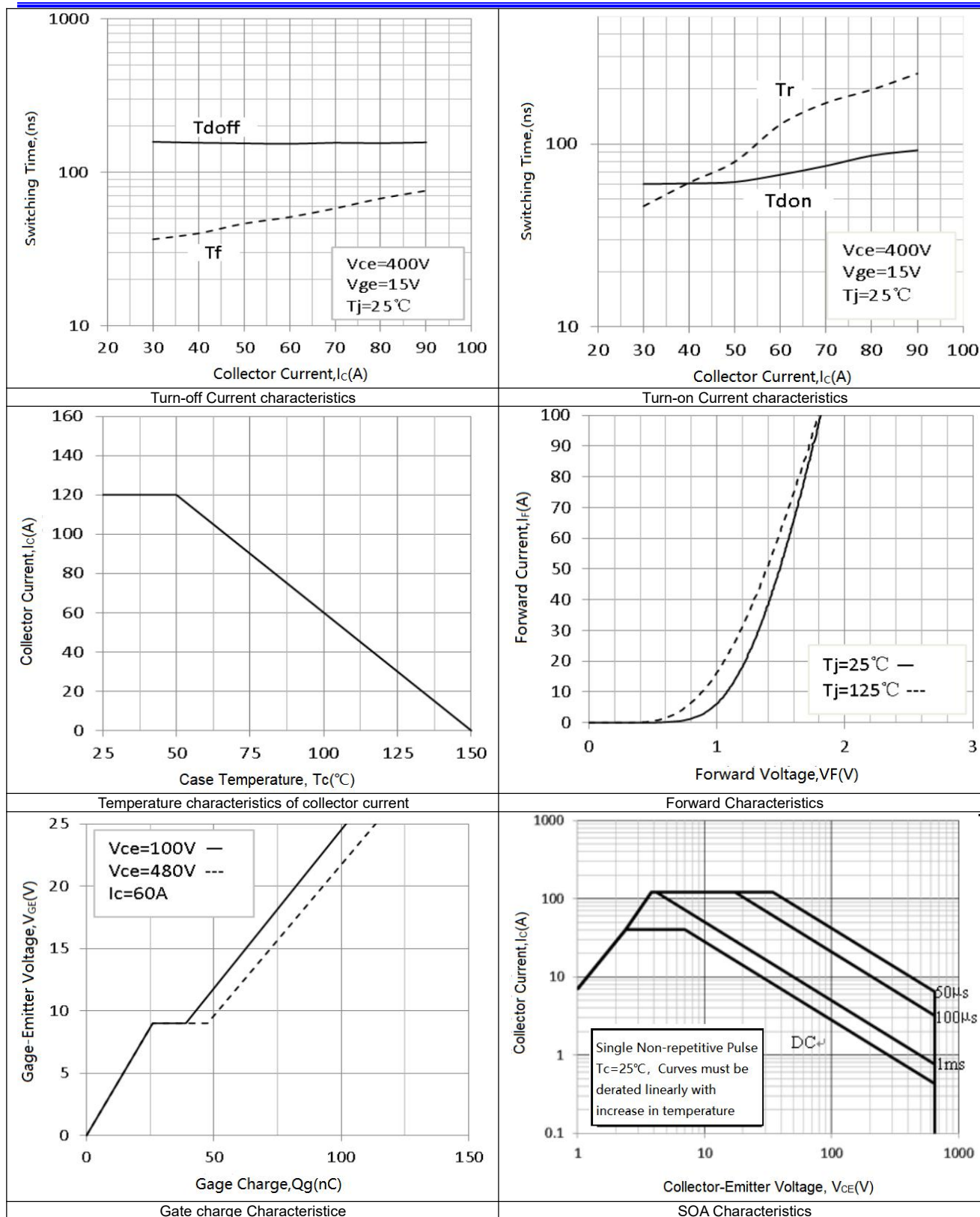
Electrical Characteristics of the IGBT (Tc= 25℃ unless otherwise specified) :

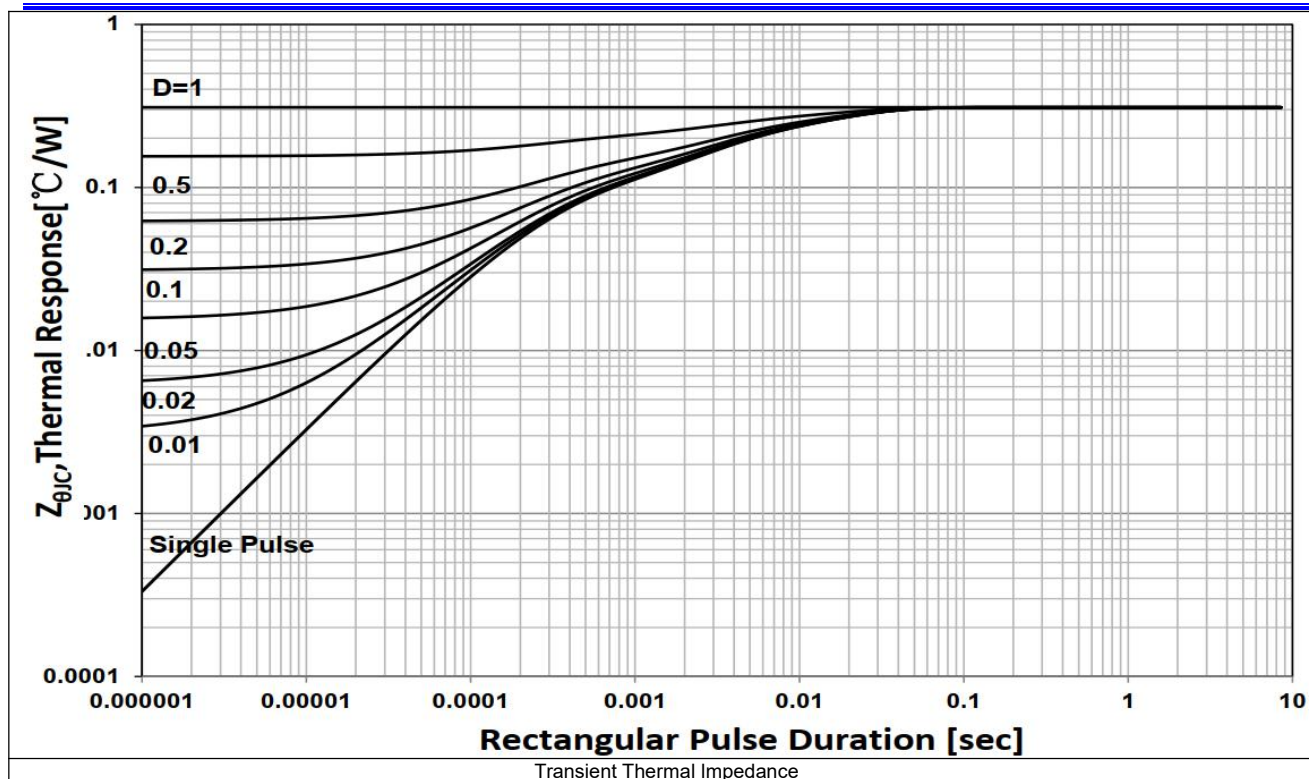
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
OFF Characteristics						
V _{(BR)CES}	Collector-Emitter Breakdown Voltage	V _{GE} =0V,I _{CE} =250uA	650	720	--	V
I _{CES}	Collector-Emitter Leakage Current	V _{GE} =0V,V _{CE} =650V	--	--	3.0	mA
I _{GES(F)}	Gate to Emitter Forward Leakage	V _{GE} =+20V	--	--	+250	nA
I _{GES(R)}	Gate to Source Reverse Leakage	V _{GE} =-20V	--	--	-250	nA
ON Characteristics						
V _{CE(sat)}	Collector-Emitter Saturation Voltage	I _C =60A ,V _{GE} =15V	--	1.85	2.4	V
V _{GE(th)}	Gate Threshold Voltage	I _C =1mA ,V _{CE} =V _{GE}	4.0	5.4	7.0	V
Pulse width tp≤300μs,δ≤2%						
Dynamic Characteristics						
C _{ies}	Input Capacitance	V _{CE} =30V,V _{GE} =0V f=1MHz	--	3398	--	pF
C _{oes}	Output Capacitance		--	224	--	
C _{res}	Reverse Transfer Capacitance		--	44	--	
Resistive Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{CE} =400V,I _C =60A, R _g =10 Ω ,V _{GE} =15V, Inductive Load,Ta=25℃ ,	--	66	--	ns
t _r	Rise Time		--	124	--	
t _{d(off)}	Turn-Off Delay Time		--	152	--	
t _f	Fall Time		--	51	--	
E _{on}	Turn-On Switching Loss		--	4.79	--	mJ
E _{off}	Turn-Off Switching Loss		--	1.39	--	
E _{ts}	Total Switching Loss		--	6.18	--	
t _{d(on)}	Turn-on Delay Time	V _{CE} =400V,I _C =60A, R _g =10 Ω ,V _{GE} =15V, Inductive Load,Ta=25℃ ,	--	66	--	ns
t _r	Rise Time		--	112	--	
T _{d(off)}	Turn-Off Delay Time		--	167	--	
t _f	Fall Time		--	50	--	
E _{on} ^{a2}	Turn-On Switching Loss		--	4.73	--	mJ
E _{off}	Turn-Off Switching Loss		--	1.50	--	
E _{ts}	Total Switching Loss		--	6.23	--	
Q _g	Total Gate Charge	V _{CE} =400V,I _C =60A, V _{GE} =15V,	--	117	--	nC
Q _{ge}	Gate to Emitter Charge		--	35	--	
Q _{gc}	Gate to Collector Charge		--	47	--	
Electrical Characteristics of the DIODE						
V _F	Diode Forward Voltage	I _F =30A	--	1.3	1.8	V
t _{rr}	Reverse Recovery Time	I _F =30A di/dt=200A/uS	--	80	--	ns
I _{rrm}	Diode Peak Reverse Recovery Current		--	6	--	A
Q _{rr}	Reverse Recovery Charge		--	240	--	nC
Pulse width t tp≤300μs,δ≤2%						

Typical characteristics diagrams



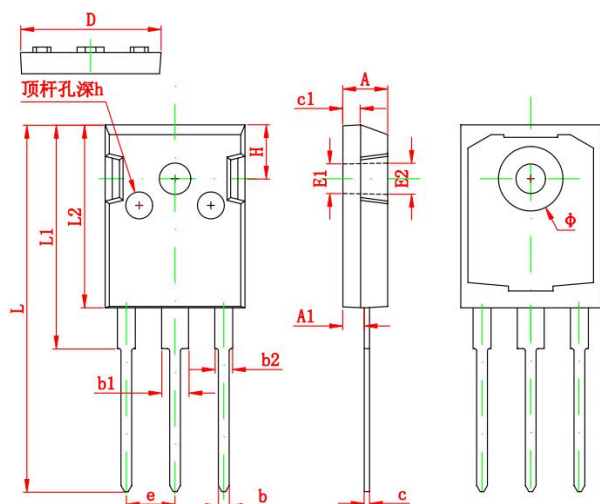






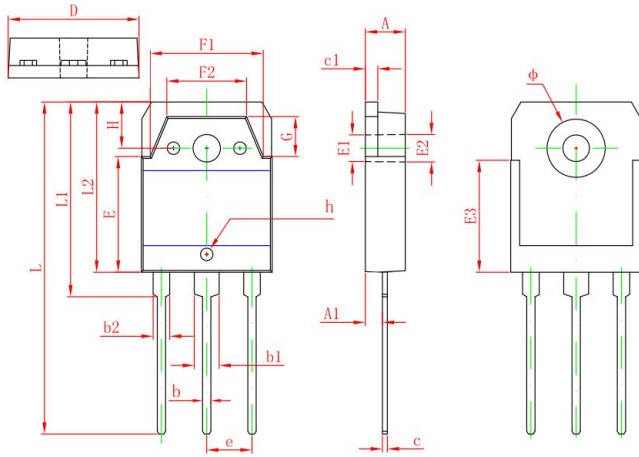
Dimensions

TO-247 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.850	5.150	0.191	0.200
A1	2.200	2.600	0.087	0.102
b	1.000	1.400	0.039	0.055
b1	2.800	3.200	0.110	0.126
b2	1.800	2.200	0.071	0.087
c	0.500	0.700	0.020	0.028
c1	1.900	2.100	0.075	0.083
D	15.450	15.750	0.608	0.620
E1	3.500 REF		0.138 REF	
E2	3.600 REF		0.142 REF	
L	40.900	41.300	1.610	1.626
L1	24.800	25.100	0.976	0.988
L2	20.300	20.600	0.799	0.811
Φ	7.100	7.300	0.280	0.287
e	5.450 TYP		0.215 TYP	
H	5.980 REF		0.235 REF	
h	0.000	0.300	0.000	0.012

TO-3PN PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.600	5.000	0.181	0.197
A1	2.200	2.600	0.087	0.102
b	0.800	1.200	0.031	0.047
b1	2.800	3.200	0.110	0.126
b2	1.800	2.200	0.071	0.087
c	0.500	0.700	0.020	0.028
c1	1.450	1.650	0.057	0.065
D	15.450	15.850	0.608	0.624
E	13.700	14.100	0.539	0.555
E1	3.200 REF		0.126 REF	
E2	3.300 REF		0.130 REF	
E3	13.450 REF		0.530 REF	
F1	13.400	13.800	0.528	0.543
F2	9.400	9.800	0.370	0.386
L	39.900	40.300	1.571	1.587
L1	23.200	23.600	0.913	0.929
L2	20.300	20.600	0.799	0.811
Φ	6.900	7.100	0.272	0.280
G	5.150	5.550	0.203	0.219
e	5.450 TYP		0.215 TYP	
H	5.000 REF		0.197 REF	
h	0.000	0.300	0.000	0.012