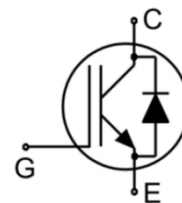


**Main Product Characteristics:**

$V_{CES}$	1250V
$I_C$	40A
$V_{CE(sat)}$	1.75V


**TO-247**

**Schematic Diagram**
**Features and Benefits:**

- Trench FS technology offering
- High speed switching
- Low gate charge and  $V_{CE(sat)}$
- High ruggedness, temperature stable behavior
- Maximum junction temperature 175°C


**Applications:**

- Solar Inverters
- Uninterruptible power supplies
- Motor drives
- Air condition

**Absolute Max Rating:**

Symbol	Parameter	Value	Units
$V_{CES}$	Collector-Emitter Voltage	1250	V
$V_{GES}$	Gate- Emitter Voltage	$\pm 30$	V
$I_C$	Collector Current	80	A
	Collector Current @ $T_c = 100\text{ }^\circ\text{C}$	40	
$I_{Cpuls}$	Pulsed Collector Current, $t_p$ limited by $T_{Jmax}$	160	
-	Turn off safe operating area, $V_{CE}=1200V$ , $T_J=175^\circ\text{C}$	160	
$I_F$	Diode Continuous Forward Current @ $T_c = 100\text{ }^\circ\text{C}$	40	
$I_{FM}$	Diode Maximum Forward Current	160	
$P_D$	Power Dissipation @ $T_c = 25^\circ\text{C}$	600	W
$T_J$ $T_{STG}$	Operating Junction and Storage Temperature Range	-55 to +175	$^\circ\text{C}$
$T_L$	Maximum Temperature for Soldering	260	$^\circ\text{C}$

**Thermal Resistance**

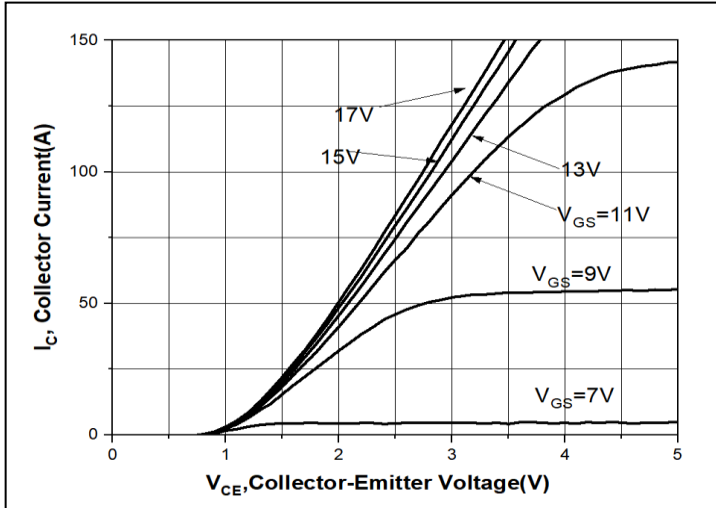
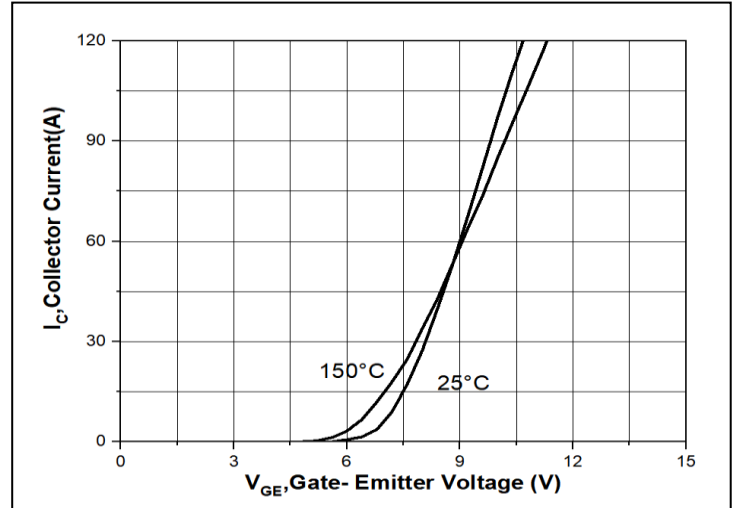
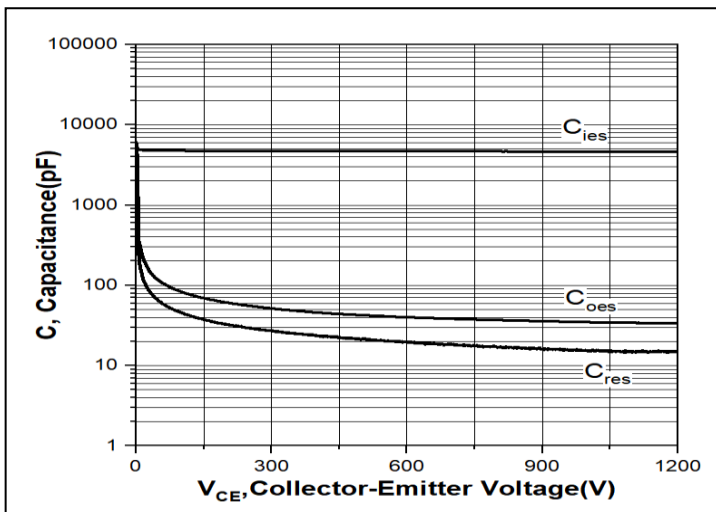
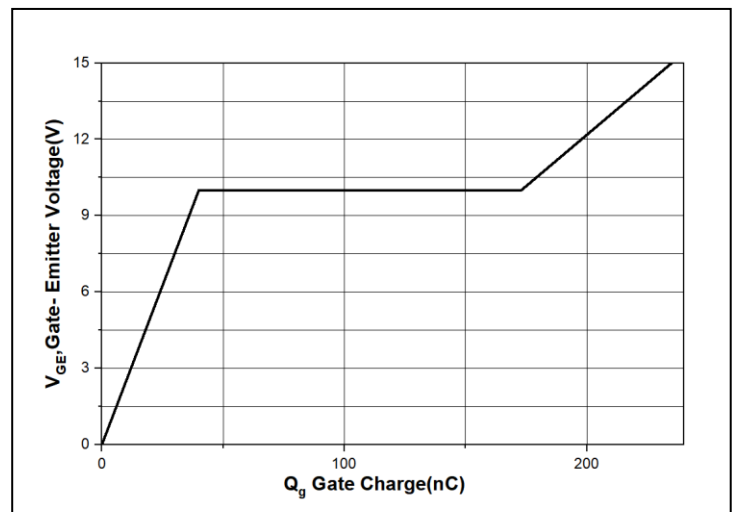
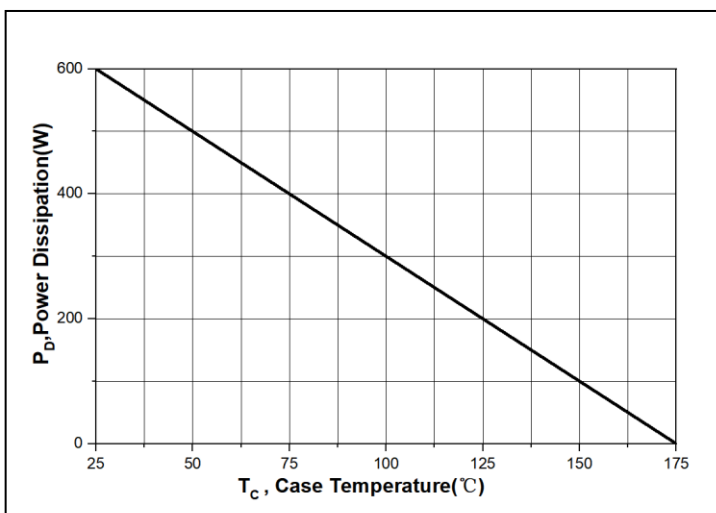
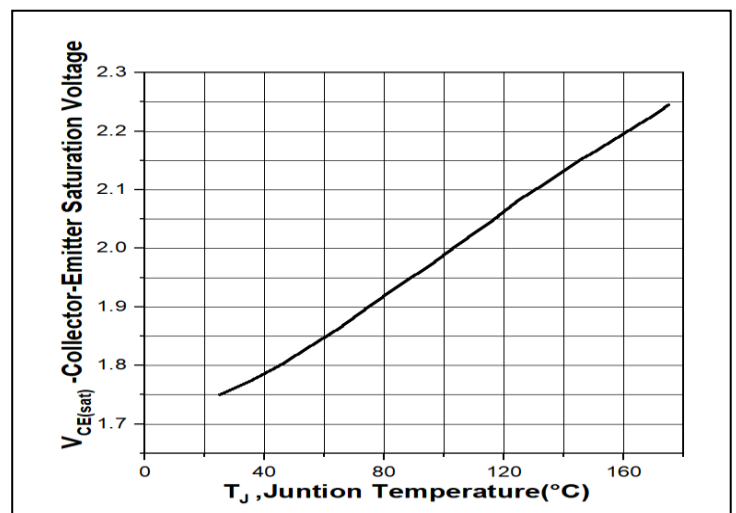
Symbol	Characterizes	Typ.	Max.	Units
R <sub>θJC</sub>	Thermal Resistance, Junction-to-case for IGBT	—	0.25	°C/W
	Thermal Resistance, Junction-to-case for Diode	—	0.63	°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction-to-ambient	—	40	°C/W

**Electrical Characteristics @T<sub>A</sub>=25°C unless otherwise specified**

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
V <sub>(BR)CES</sub>	Collector-Emitter Breakdown Voltage	1250	—	—	V	V <sub>GE</sub> =0V, I <sub>CE</sub> =1mA
V <sub>CE(sat)</sub>	Collector-Emitter Saturation Voltage	—	1.75	2	V	I <sub>C</sub> =40A, V <sub>GE</sub> =15V @T <sub>J</sub> =25°C
V <sub>GE(th)</sub>	Gate Threshold Voltage	4.5	—	6.5	V	I <sub>C</sub> =1mA, V <sub>CE</sub> =V <sub>GE</sub>
I <sub>CES</sub>	Collector-Emitter Leakage Current	—	—	1	μA	V <sub>GE</sub> =0V, V <sub>CE</sub> =1200V
I <sub>GES</sub>	Gate to Emitter Reverse Leakage	—	—	200	nA	V <sub>GE</sub> =25V, V <sub>CE</sub> =0V
		—	—	-200		V <sub>GE</sub> =-25V, V <sub>CE</sub> =0V
C <sub>ies</sub>	Input capacitance	—	4803	—	pF	V <sub>GS</sub> = 0V V <sub>DS</sub> = 25V f = 1MHz
C <sub>oes</sub>	Output capacitance	—	171	—		
C <sub>res</sub>	Reverse transfer capacitance	—	92	—		
t <sub>d(on)</sub>	Turn-on delay time	—	40	—	ns	V <sub>CC</sub> =600V, V <sub>GE</sub> =0.0/15.0V, R <sub>G</sub> =10.0Ω
t <sub>r</sub>	Rise time	—	22	—		
t <sub>d(off)</sub>	Turn-Off delay time	—	358	—		
t <sub>f</sub>	Fall time	—	47	—		
E <sub>on</sub>	Turn-On Switching Loss	—	2.29	—	mJ	V <sub>CC</sub> =600V, V <sub>GE</sub> =0.0/15.0V, R <sub>G</sub> =10.0Ω
E <sub>off</sub>	Turn-Off Switching Loss	—	1.74	—		
E <sub>is</sub>	Total Switching Loss	—	4.03	—		
Q <sub>g</sub>	Total Gate Charge	—	235	—	nC	V <sub>CC</sub> =480V, I <sub>C</sub> =40A, V <sub>GE</sub> =15V
Q <sub>ge</sub>	Gate to Emitter Charge	—	40	—		
Q <sub>gc</sub>	Gate to Collector Charge	—	133	—		
I <sub>C(SC)</sub>	Short circuit collector current Max.1000 short circuits Time between short circuits: ≥1.0s	—	400	—	A	V <sub>GE</sub> =15V, V <sub>CC</sub> ≤600V, t <sub>sc</sub> ≤10μs

**Electrical Characteristics of the Diode @T<sub>A</sub>=25°C unless otherwise specified**

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
V <sub>FM</sub>	Diode Forward Voltage	—	2.3	3	V	I <sub>F</sub> =40A, V <sub>GE</sub> =0V
t <sub>rr</sub>	Reverse Recovery Time	—	223	—	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> =40A, V <sub>GE</sub> =0.0/15.0V, V <sub>R</sub> =600V
Q <sub>rr</sub>	Reverse Recovery Charge	—	2.99	—	μC	
I <sub>RRM</sub>	Diode Peak Reverse Recovery Current	—	34.5	—	A	

**Typical Electrical and Thermal Characteristics**

**Figure1. Typical Output Characteristics**

**Figure2. Typical Transfer Characteristics**

**Figure3. Typical Capacitance**

**Figure4. Typical Gate Charge**

**Figure5. Power Dissipation vs. Case Temperature**

**Figure6. Collector-Emmitter Saturation Voltage vs. Temperature**

Typical Electrical and Thermal Characteristics

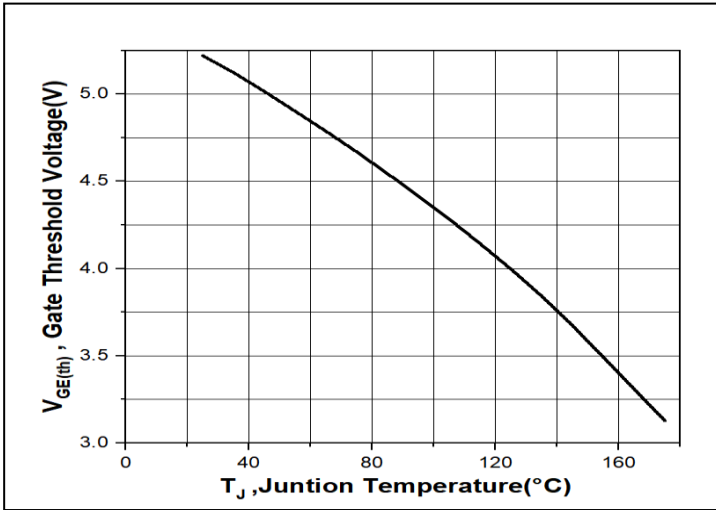


Figure7. Gate Threshold Voltage vs. Temperature

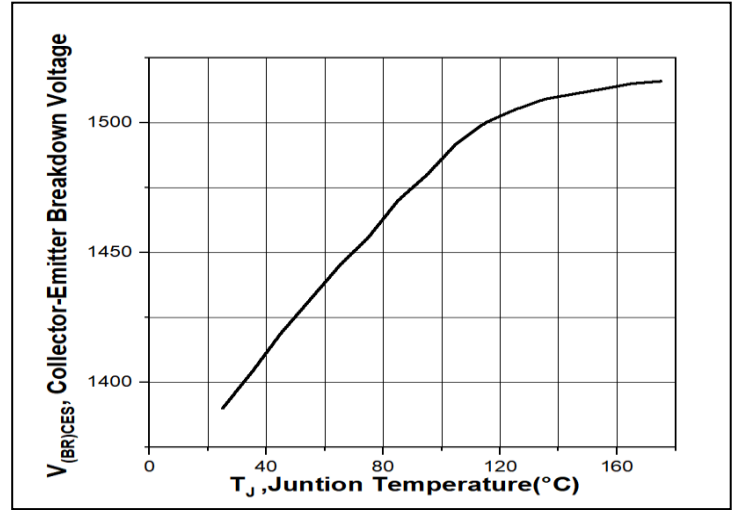


Figure8. Collector-Emitter Breakdown Voltage vs. Temperature

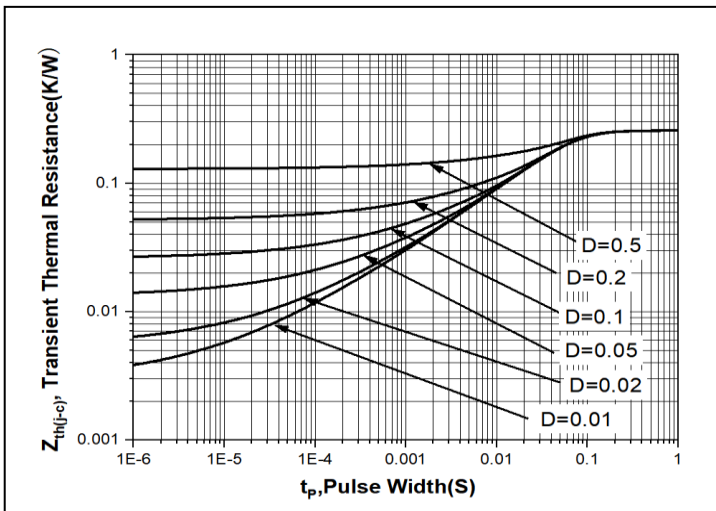


Figure9. IGBT transient thermal resistance (D= t<sub>p</sub>/T)

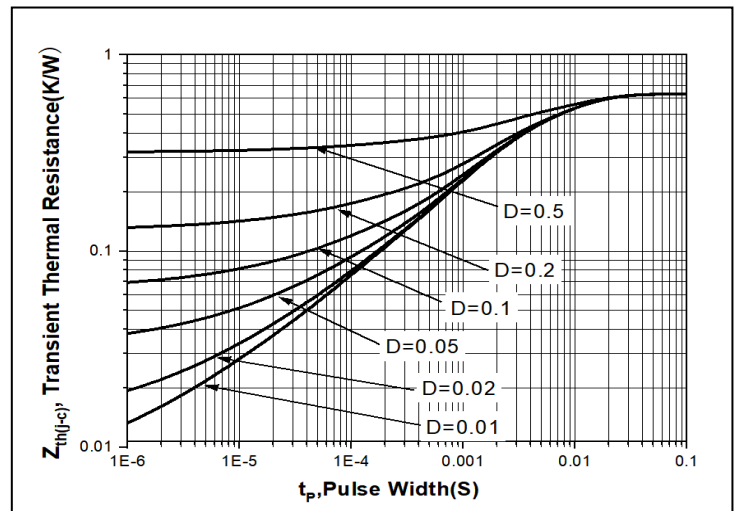
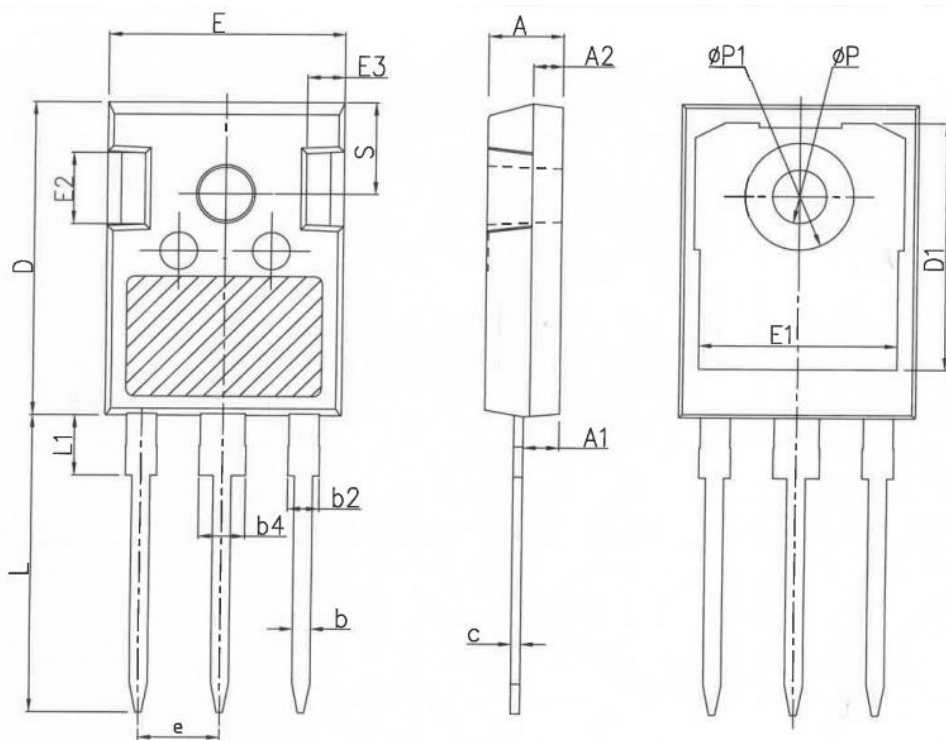


Figure10. Diode transient thermal impedance as a function of pulse width (D=t<sub>p</sub>/T)

**Mechanical Data:**

**COMMON DIMENSIONS**

SYMBOL	mm		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.59
A2	1.85	2.00	2.15
b	1.11	1.21	1.36
b2	1.91	2.01	2.21
b4	2.91	3.01	3.21
c	0.51	0.61	0.75
D	20.70	21.00	21.30
D1	16.25	16.55	16.85
E	15.50	15.80	16.10
E1	13.00	13.30	13.60
E2	4.80	5.00	5.20
E3	2.30	2.50	2.70
e	5.44BSC		
L	19.62	19.92	20.22
L1	-	-	4.30
ΦP	3.40	3.60	3.80
ΦP1	-	-	7.30
S	6.15BSC		

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