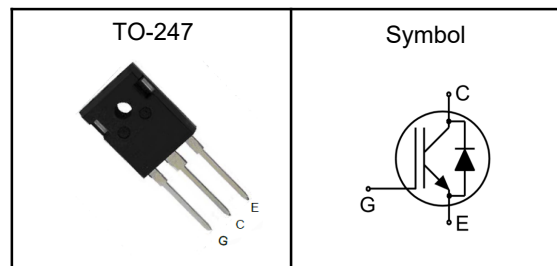


**600V/30A Field Stop Trench IGBT**
**Features**

- Trench FS II Technology
- Very low  $V_{CE(sat)}$
- High speed switching
- ROHS Compliant

**Applications**

- Inverter welding machine
- Motor drives
- UPS

**Pin Description**


$V_{CES}$	600	V
$V_{CE(sat)-Typ}$	1.7	V
$I_C$	30	A

**Absolute Maximum Ratings** ( $T_C=25^{\circ}C$ , Unless Otherwise Noted)

Parameter	Symbol	Rating	Units
Collector-Emitter Voltage	$V_{CES}$	600	V
Gate- Emitter Voltage	$V_{GES}$	$\pm 30$	V
Collector Current <sup>1</sup>	$I_C$	60	A
Collector Current <sup>1</sup>	$I_C$	30	A
Pulsed Collector Current <sup>2</sup>	$I_{CM}$	90	A
Diode Continuous Forward Current	$I_F$	60	A
Diode Continuous Forward Current	$I_F$	30	A
Diode Pulsed Forward Current	$I_{FM}$	90	A
Power Dissipation	$P_D$	190	W
Power Dissipation	$P_D$	75	W
Storage Temperature Range	$T_{STG}$	-55 to 150	$^{\circ}C$
Operating Junction Temperature Range	$T_J$	-55 to 150	$^{\circ}C$

**Thermal Characteristics**

Parameter	Symbol	Typ	Max	Unit
Thermal Resistance Junction-Ambient	$R_{\theta JA}$	---	40	$^{\circ}C/W$
Thermal Resistance Junction to case for IGBT	$R_{\theta JC}$	---	0.5	$^{\circ}C/W$
Thermal Resistance Junction to case for Diode	$R_{\theta JCD}$	---	1.12	$^{\circ}C/W$



**600V/30A Field Stop Trench IGBT**

**Electrical Characteristics** ( $T_J=25^{\circ}\text{C}$ , Unless Otherwise Noted)

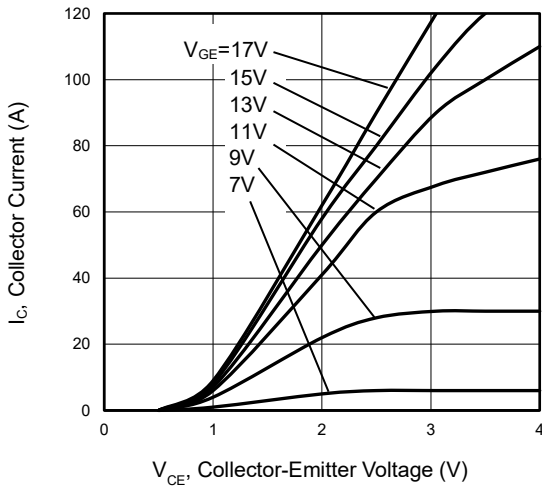
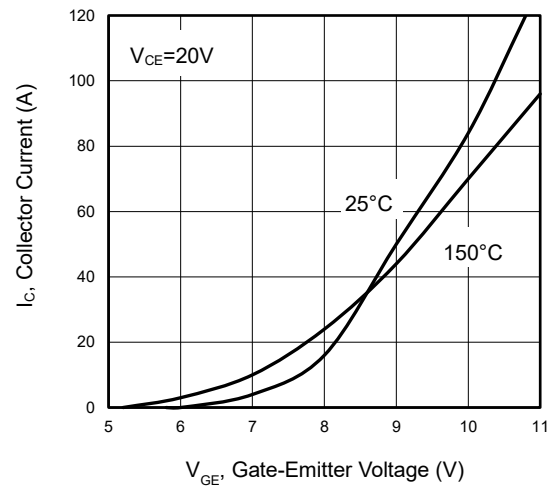
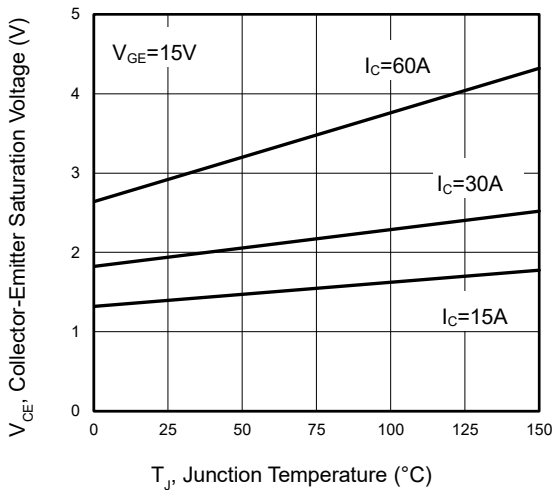
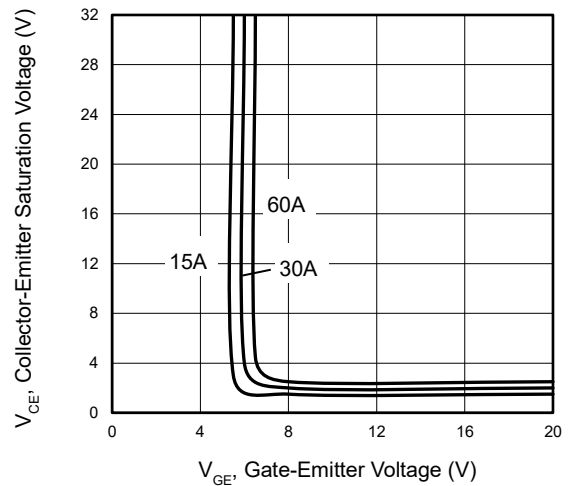
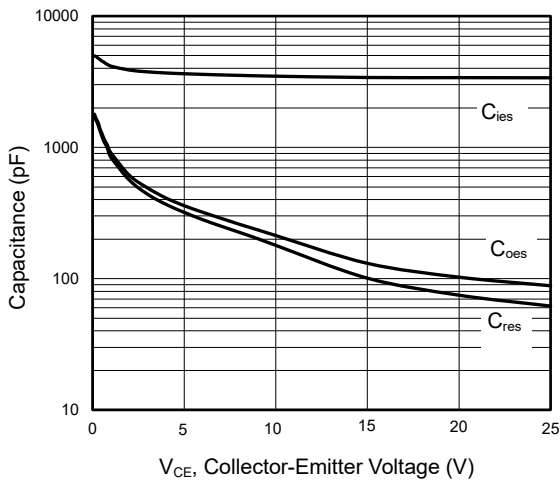
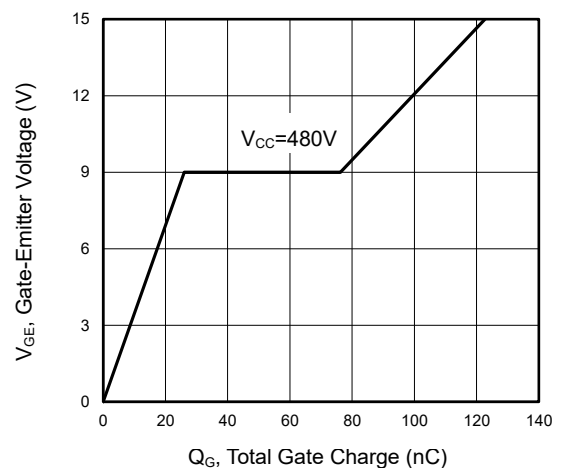
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Collector-Emitter Breakdown Voltage	$V_{(BR)CES}$	$V_{GE}=0\text{V}$ , $I_D=1\text{mA}$	600	---	---	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15\text{V}$ , $I_C=30\text{A}$ , $T_J=25^{\circ}\text{C}$	---	1.7	2.0	V
		$V_{GE}=15\text{V}$ , $I_C=30\text{A}$ , $T_J=150^{\circ}\text{C}$	---	1.9	---	V
Gate Threshold Voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}$ , $I_C=1\text{mA}$	4	5.5	6.5	V
Collector-Emitter Leakage Current	$I_{CES}$	$V_{CE}=600\text{V}$ , $V_{GE}=0\text{V}$ , $T_J=25^{\circ}\text{C}$	---	---	0.01	mA
		$V_{CE}=600\text{V}$ , $V_{GE}=0\text{V}$ , $T_J=150^{\circ}\text{C}$	---	---	1	mA
Gate to Emitter Leakage Current	$I_{GES}$	$V_{GE}=\pm 30\text{V}$ , $V_{CE}=0\text{V}$	---	---	$\pm 250$	nA
Total Gate Charge	$Q_g$	$V_{CC}=480\text{V}$ , $V_{GE}=15\text{V}$ , $I_C=30\text{A}$	---	122	---	nC
Gate to Emitter Charge	$Q_{ge}$		---	31	---	nC
Gate to Collector Charge	$Q_{gc}$		---	54	---	nC
Turn-On Delay Time	$t_{d(ON)}$	$V_{CE}=400\text{V}$ , $V_{GE}=0/15\text{V}$ , $R_G=5\Omega$ , $I_C=30\text{A}$ , $T_J=25^{\circ}\text{C}$ Inductive Load	---	20	---	ns
Rise Time	$t_r$		---	16	---	
Turn-Off Delay Time	$t_{d(off)}$		---	160	---	
Fall Time	$t_f$		---	15	---	mJ
Turn-On Switching Loss	$E_{on}$		---	0.35	---	
Turn-Off Switching Loss	$E_{off}$	---	0.32	---		
Total Switching Loss	$E_{ts}$	---	0.67	---		
Input Capacitance	$C_{ies}$	$V_{CE}=25\text{V}$ , $V_{GE}=0\text{V}$ , $f=1\text{MHz}$	---	3450	---	pF
Output Capacitance	$C_{oes}$		---	92	---	
Reverse Transfer Capacitance	$C_{res}$		---	55	---	

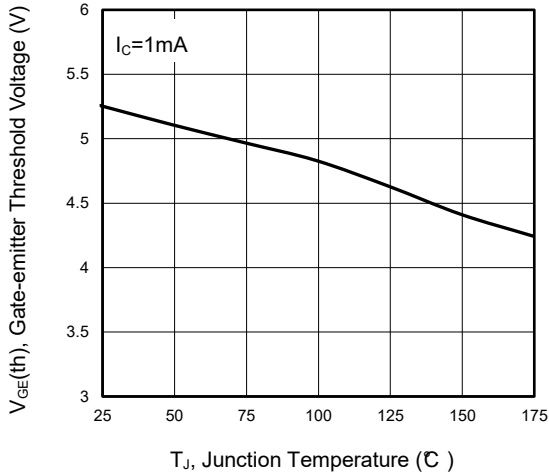
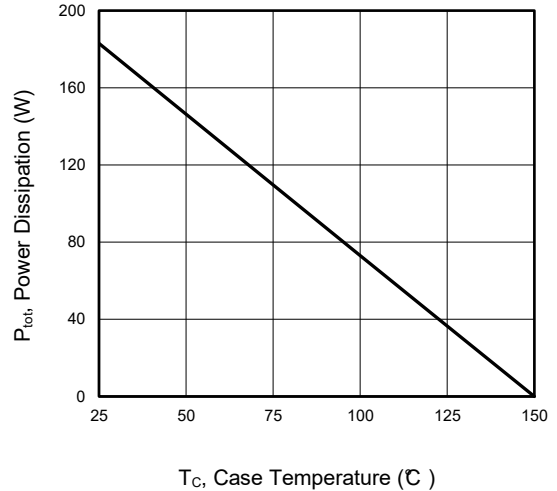
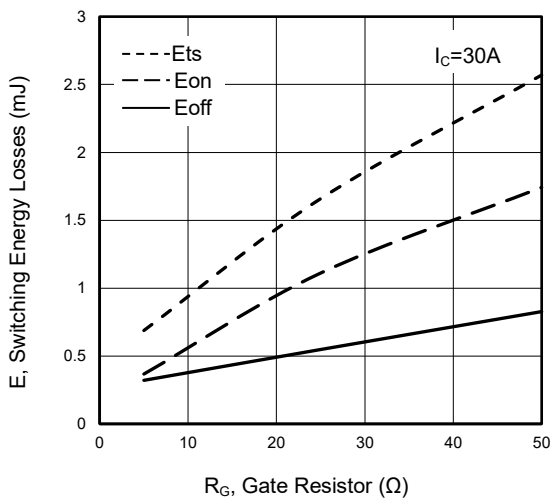
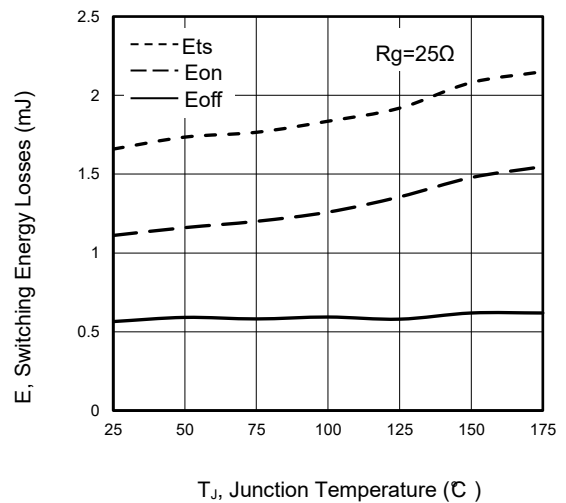
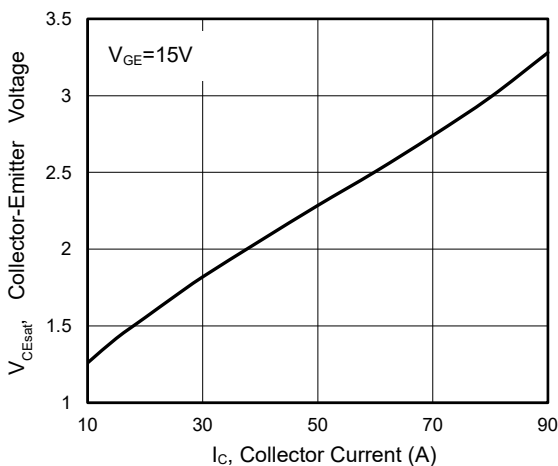
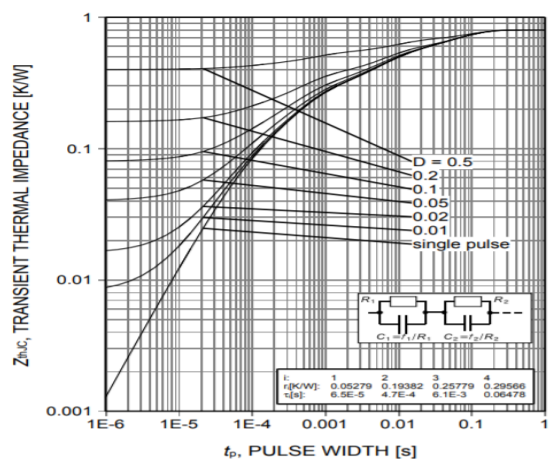
**Drain-Source Diode Characteristics**

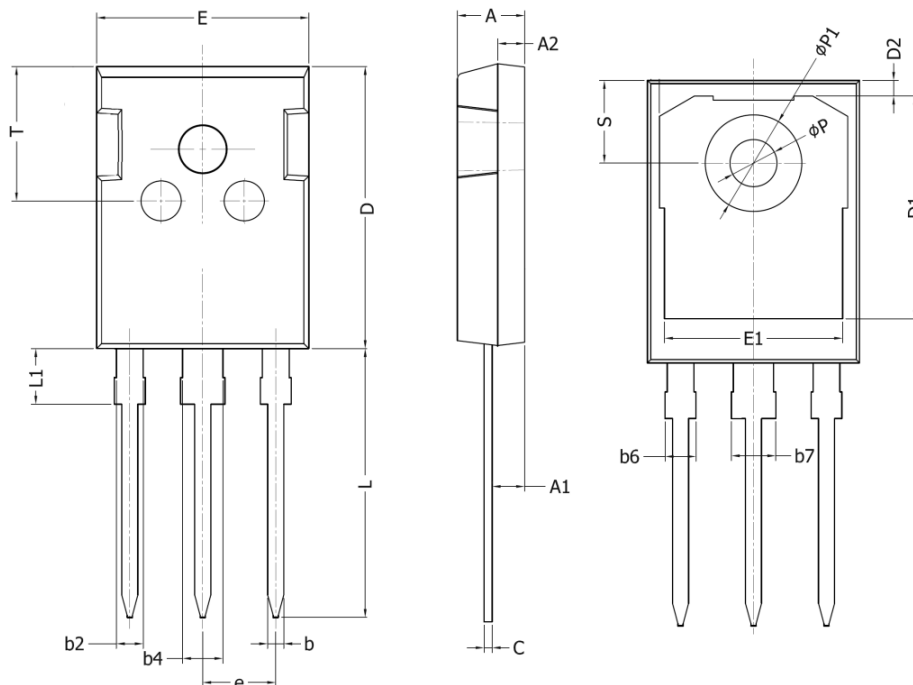
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Diode Forward Voltage	$V_F$	$V_{GE}=0\text{V}$ , $I_F=30\text{A}$ , $T_J=25^{\circ}\text{C}$	---	1.7	---	V
Reverse Recovery Time	$t_{rr}$	$I_F=30\text{A}$ , $di/dt=200\text{A}/\mu\text{s}$ , $T_J=25^{\circ}\text{C}$	---	170	---	nS
Reverse Recovery Charge	$Q_{rr}$		---	0.5	---	uC
Diode Peak Reverse Recovery Current	$I_{rrm}$		---	4.2	---	A

**Note:**

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width  $\leq 300\mu\text{s}$  , duty cycle  $\leq 2\%$

**600V/30A Field Stop Trench IGBT**
**Typical Characteristics**
**Figure 1 Output Characteristics**

**Figure 2 Transfer Characteristics**

**Figure 3  $V_{CEsat}$  vs. Case Temperature**

**Figure 4 Saturation Voltage vs.  $V_{GE}$** 

**Figure 5 Capacitance Characteristics**

**Figure 6 Gate charge waveform**


**600V/30A Field Stop Trench IGBT**
**Figure 7 Gate-emitter Threshold Voltage as a Function of Junction Temperature**

**Figure 8 Power Dissipation as a Function of Case Temperature**

**Figure 9 Typical Switching Times as a Function of Gate Resistor**

**Figure 10 Typical Switching Times as a Function of Junction Temperature**

**Figure 11 Typical Collector-emitter Saturation Voltage as a function of Collector Current**

**Figure 12 Transient Thermal Impedance**


**600V/30A Field Stop Trench IGBT**
**TO-247 Package Outline Dimensions**


Symbol	Dimensions In Millimeters	
	Min.	Max.
A	4.90	5.20
A1	2.31	2.51
A2	1.9	2.1
b	1.16	1.26
b2	1.96	2.06
b4	2.96	3.06
b6	-	2.25
b7	-	3.25
C	0.59	0.66
D	20.90	21.20
D1	16.25	16.85
D2	1.05	1.35
E	15.75	16.10
E1	13.00	13.60
e	5.436 BSC	
L	19.80	20.20
L1	-	4.30
P	3.40	3.60
P1	7.00	7.40
S	6.05	6.25
T	9.80	10.20