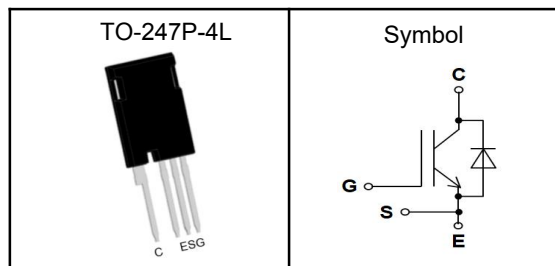


**1200V/75A Trench FS II Fast IGBT**
**Features**

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

**Applications**

- Inverter welding machine
- Motor drives
- UPS

**Pin Description**


$V_{CES}$	1200	V
$V_{CE(sat)-Typ}$	1.65	V
$I_C$	75	A

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

Parameter	Symbol	Rating	Units
Collector-Emitter Voltage	$V_{CES}$	1200	V
Gate- Emitter Voltage	$V_{GES}$	$\pm 30$	V
Collector Current <sup>1</sup>	$I_C$	150	A
Collector Current <sup>1</sup>	$I_C$	75	A
Pulsed Collector Current <sup>2</sup>	$I_{CM}$	225	A
Diode Continuous Forward Current	$I_F$	75	A
Diode Pulsed Forward Current	$I_{FM}$	225	A
Power Dissipation	$P_D$	833	W
Power Dissipation	$P_D$	417	W
Storage Temperature Range	$T_{STG}$	-55 to 175	$^\circ\text{C}$
Operating Junction Temperature Range	$T_J$	-55 to 175	$^\circ\text{C}$

**Thermal Characteristics**

Parameter	Symbol	Typ	Max	Unit
Thermal Resistance Junction-Ambient	$R_{\theta JA}$	---	40	$^\circ\text{C/W}$
Thermal Resistance Junction to case for IGBT	$R_{\theta JC}$	---	0.18	$^\circ\text{C/W}$
Thermal Resistance Junction to case for Diode	$R_{\theta JCD}$	---	0.44	$^\circ\text{C/W}$



**1200V/75A Trench FS II Fast IGBT**

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

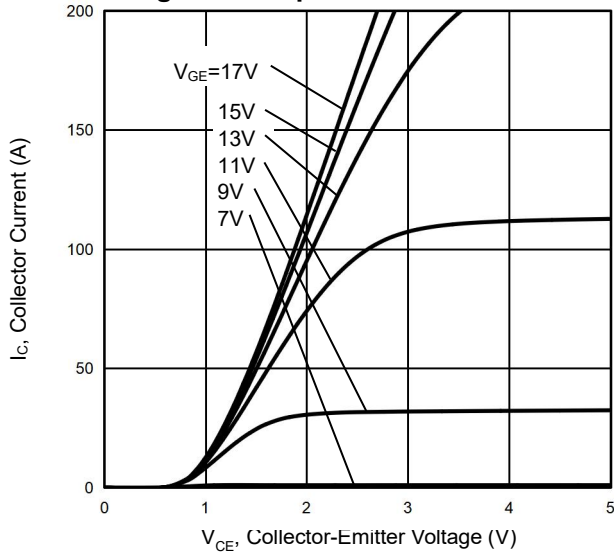
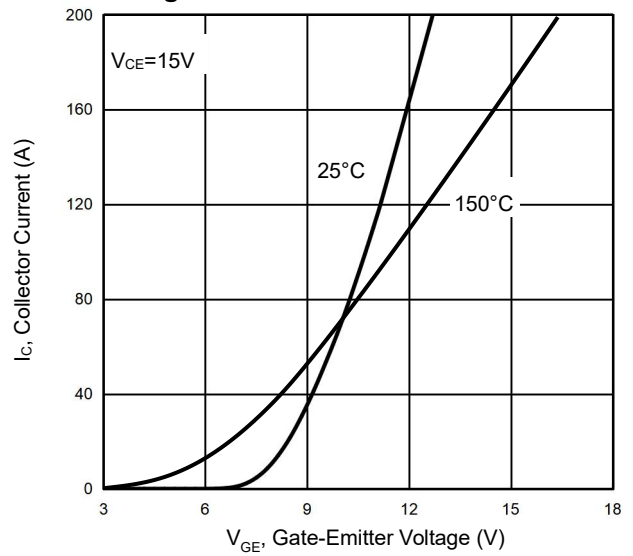
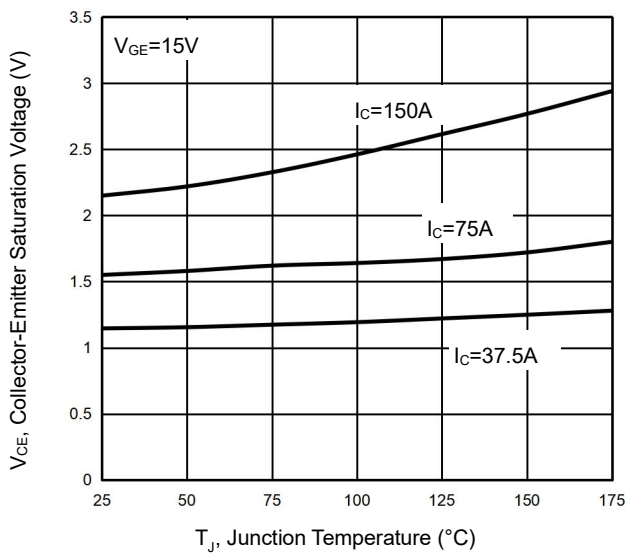
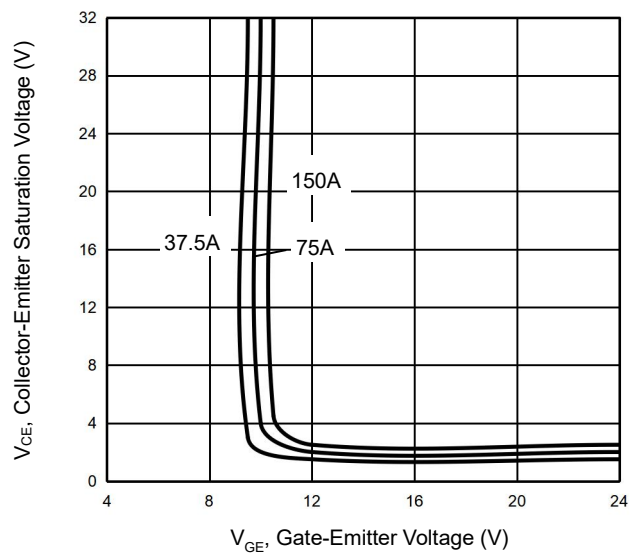
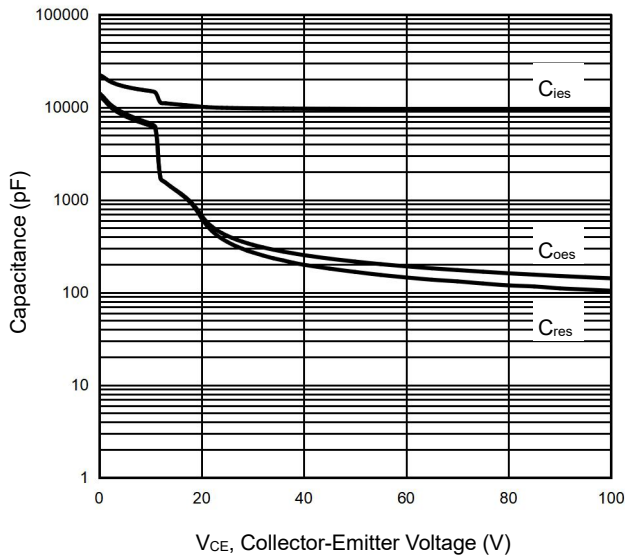
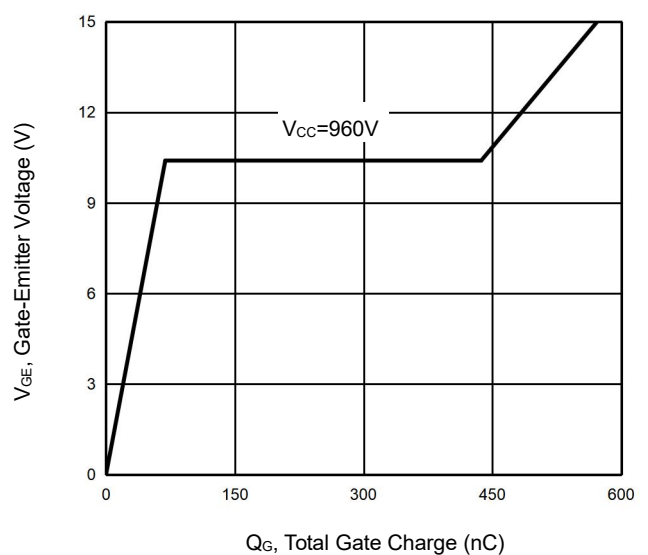
Parameter	Symbol	Conditions	Min	Typ	Max	Unit	
Collector-Emitter Breakdown Voltage	$BV_{CES}$	$V_{GE}=0V, I_D=3mA$	1200	---	---	V	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=75A,$	$T_J=25^{\circ}\text{C}$	---	1.65	2.0	V
			$T_J=175^{\circ}\text{C}$	---	1.9	---	V
Gate Threshold Voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}, I_C=3mA$	5.0	---	6.5	V	
Collector-Emitter Leakage Current	$I_{CES}$	$V_{CE}=1200V, V_{GE}=0V$	---	---	400	$\mu\text{A}$	
Gate to Emitter Leakage Current	$I_{GES}$	$V_{GE}=\pm 30V, V_{CE}=0V$	---	---	$\pm 200$	nA	
Total Gate Charge	$Q_g$	$V_{CC}=960V,$ $V_{GE}=15V, I_C=75A$	---	572	---	nC	
Gate to Emitter Charge	$Q_{ge}$		---	69	---	nC	
Gate to Collector Charge	$Q_{gc}$		---	368	---	nC	
Turn-On Delay Time	$t_{d(ON)}$	$V_{CC}=600V, I_C=75A,$ $V_{GE}=15V, R_g=8\Omega,$ Inductive Load	---	19	---	ns	
Rise Time	$t_r$		---	17	---		
Turn-Off Delay Time	$t_{d(off)}$		---	170	---		
Fall Time	$t_f$		---	18	---	mJ	
Turn-On Switching Loss	$E_{on}$		---	6.7	---		
Turn-Off Switching Loss	$E_{off}$		---	3.7	---		
Total Switching Loss	$E_{ts}$	---	10.4	---			
Input Capacitance	$C_{ies}$	$V_{CE}=30V, V_{GE}=0V, f=1\text{MHz}$	---	9747	---	pF	
Output Capacitance	$C_{oes}$		---	327	---		
Reverse Transfer Capacitance	$C_{res}$		---	271	---		

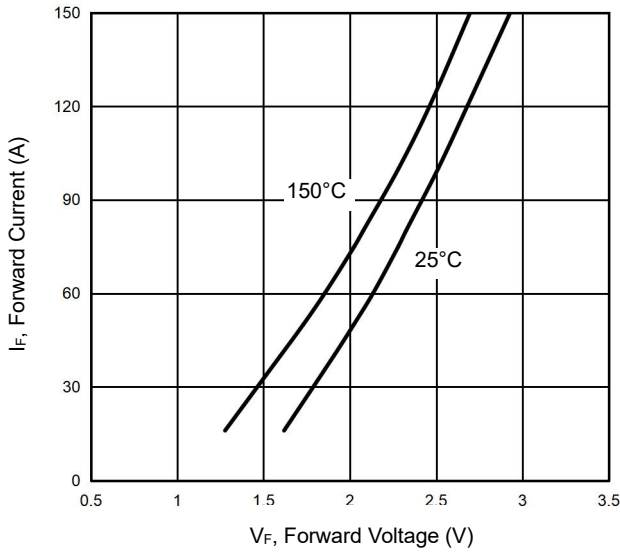
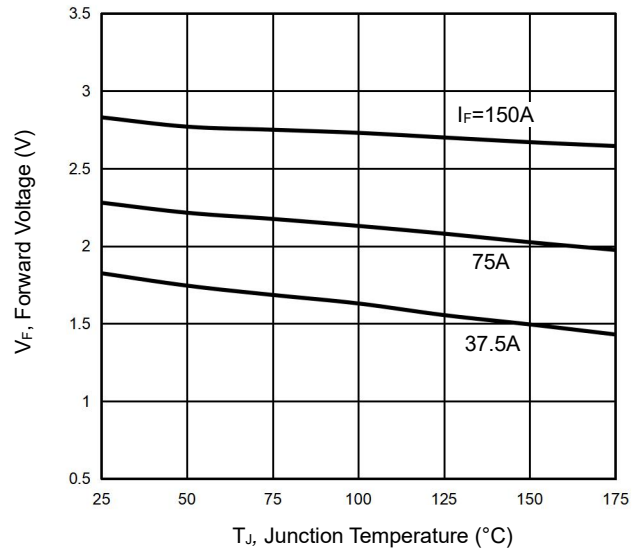
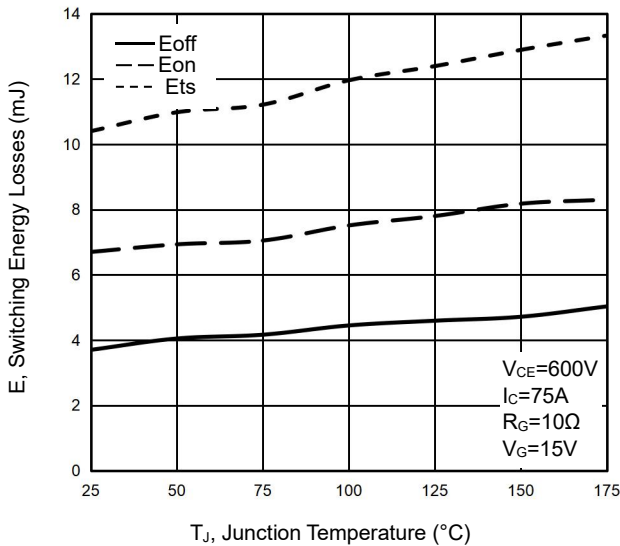
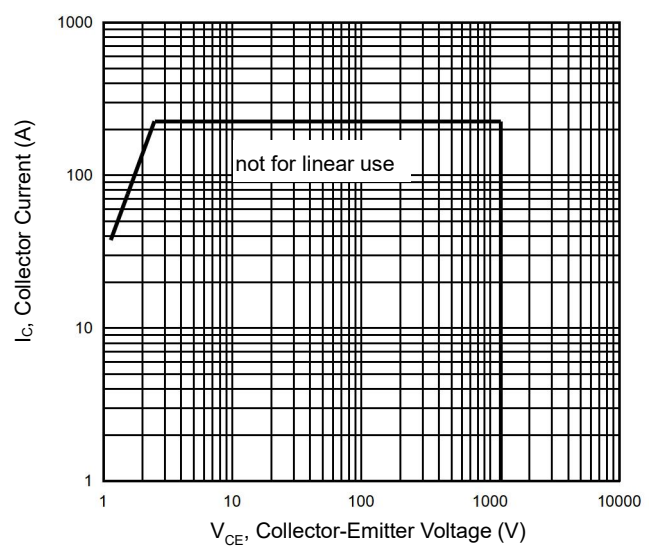
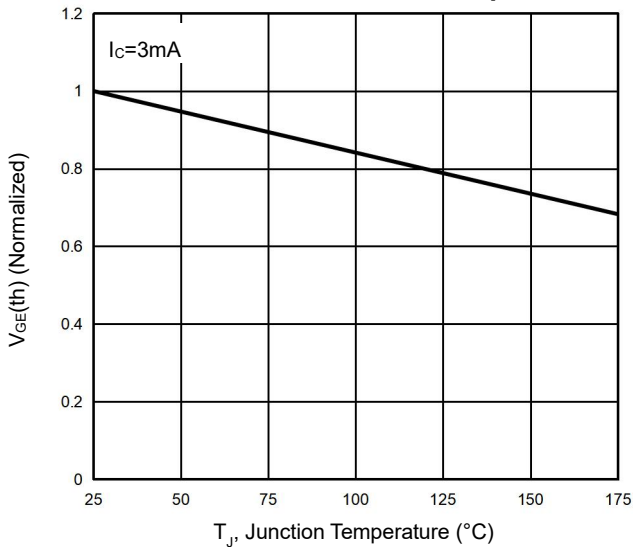
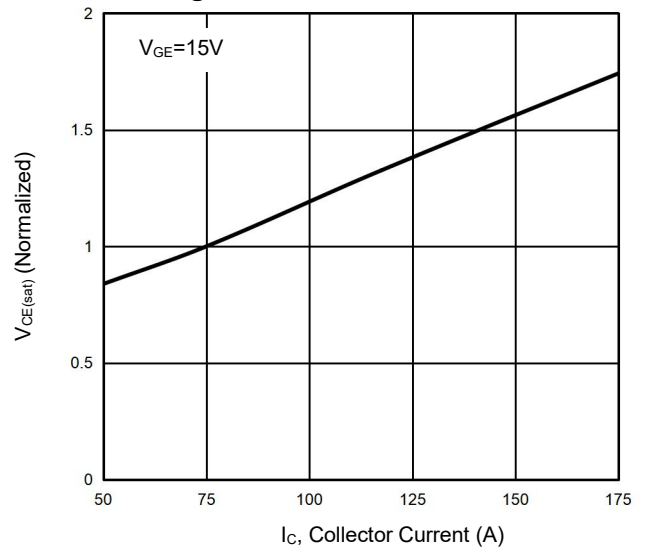
**Drain-Source Diode Characteristics**

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Diode Forward Voltage	$V_F$	$I_F=75A, T_C=25^{\circ}\text{C}$	---	2.2	2.8	V
Reverse Recovery Time	$t_{rr}$	$I_F=37.5A,$ $di/dt=800A/\mu\text{s}, T_C=25^{\circ}\text{C}$	---	180	---	nS
Reverse Recovery Charge	$Q_{rr}$		---	2.6	---	$\mu\text{C}$
Diode Peak Reverse Recovery Current	$I_{rrm}$		---	29	---	A

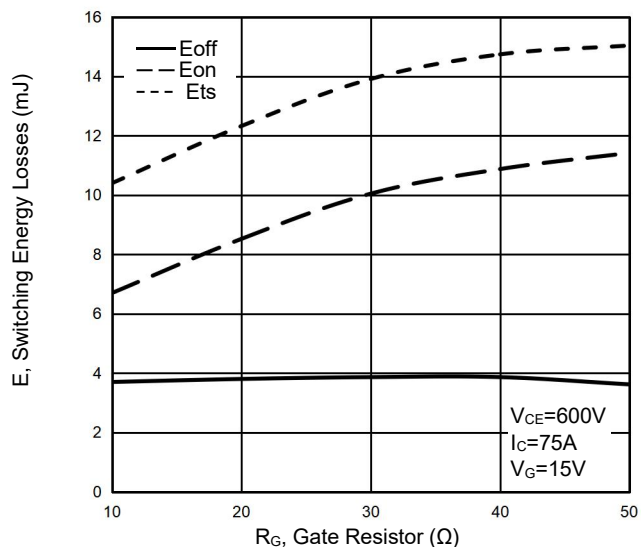
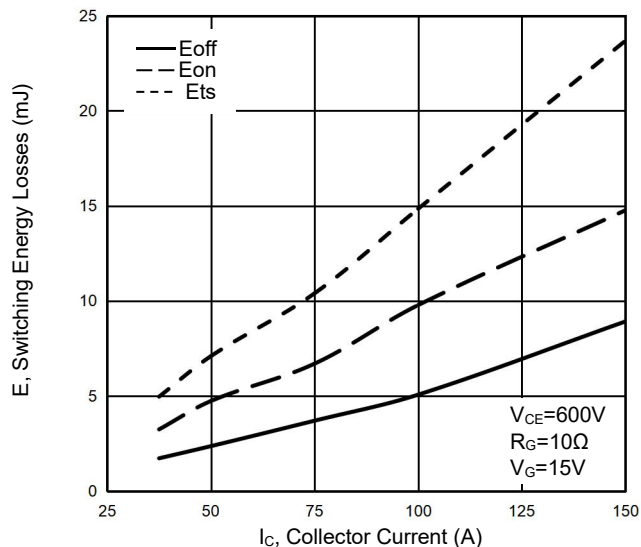
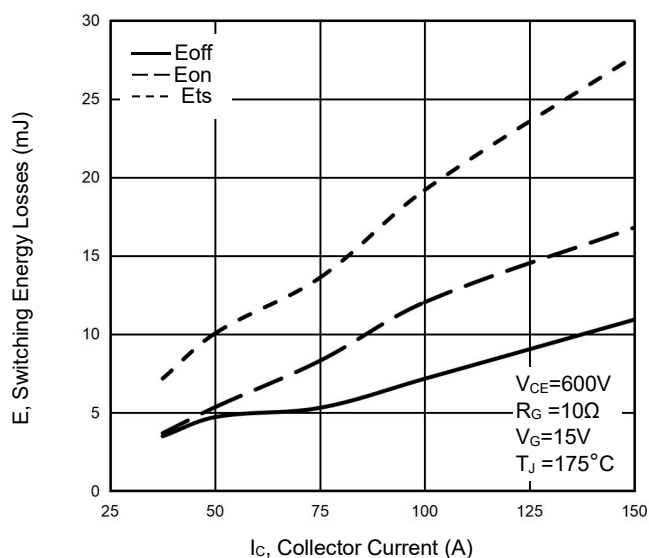
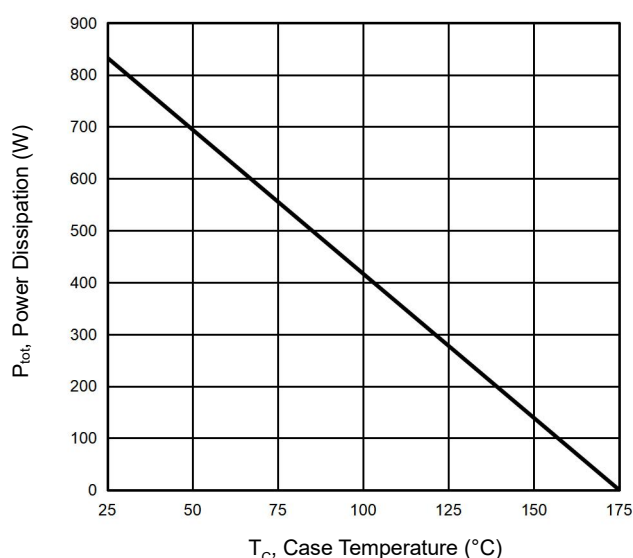
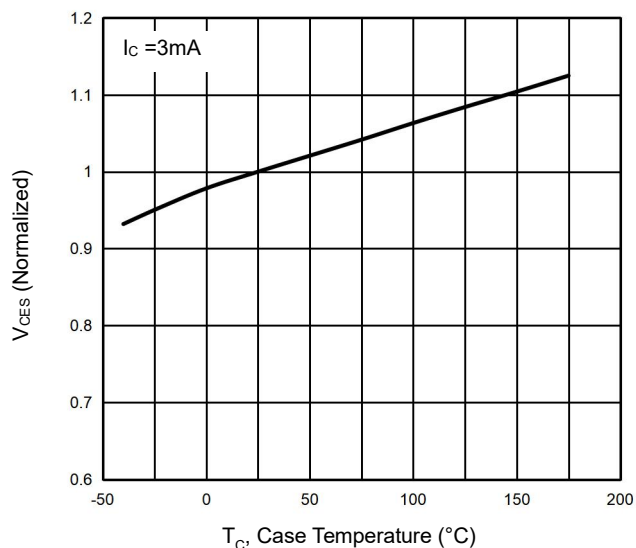
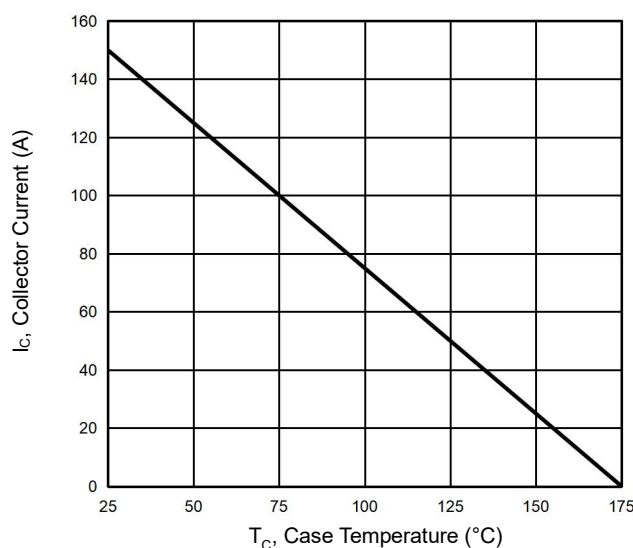
**Note:**

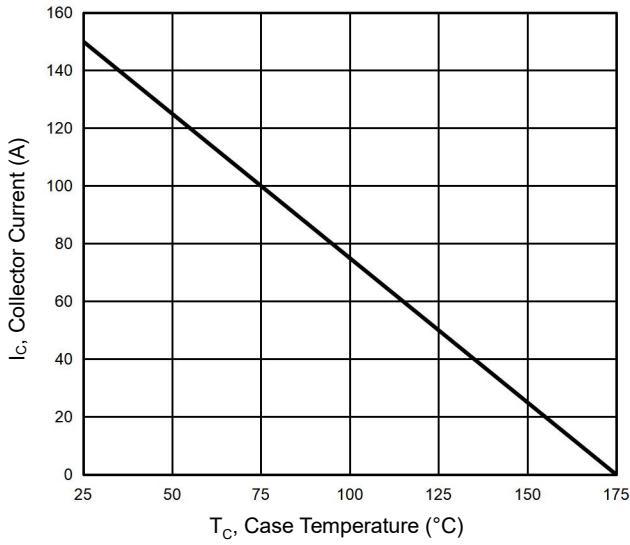
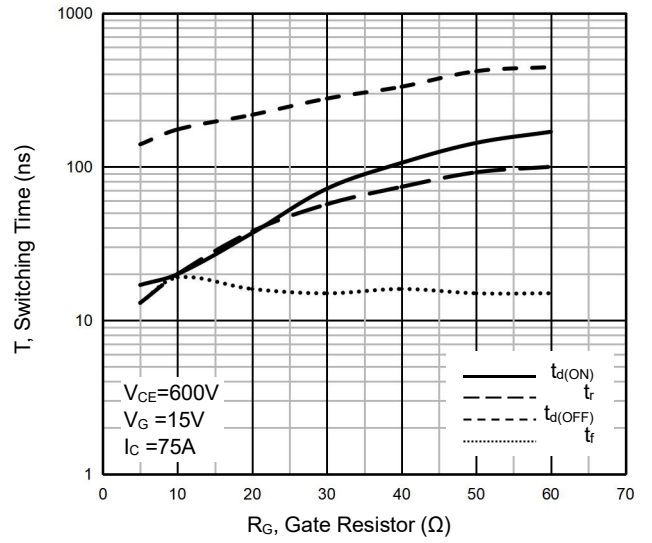
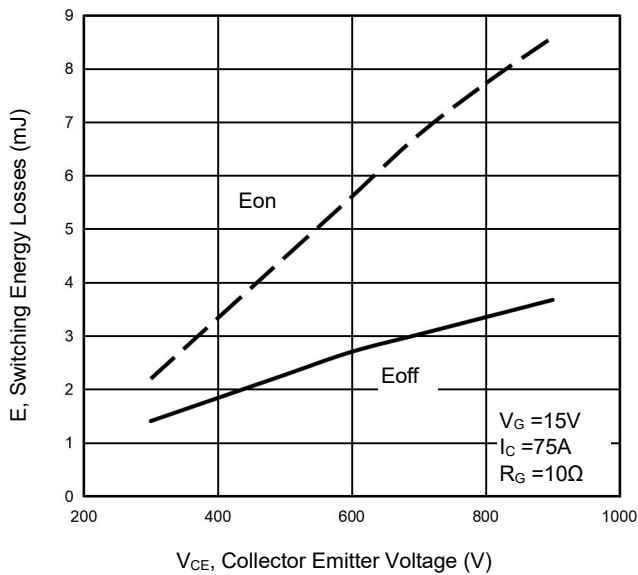
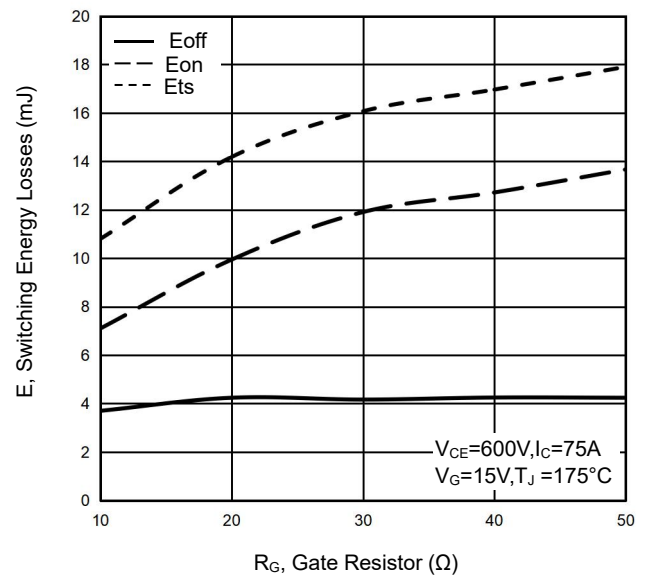
- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width  $\leq 300\mu\text{s}$  , duty cycle  $\leq 2\%$

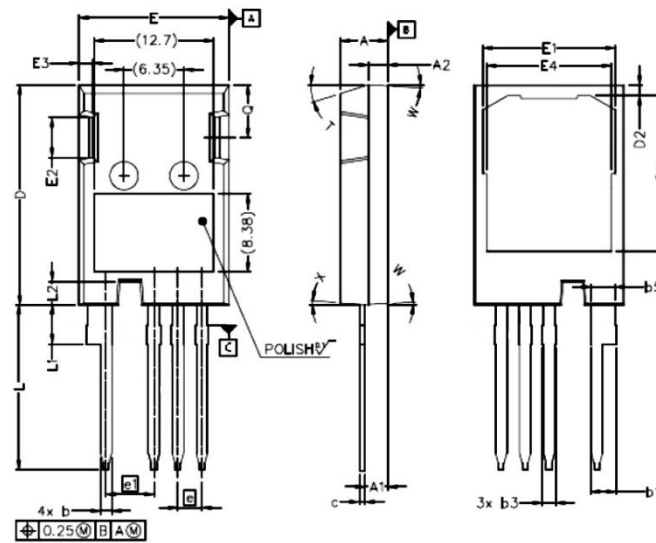
**1200V/75A Trench FS II Fast IGBT**
**Typical Characteristics**
**Figure 1 Output Characteristics**

**Figure 2 Transfer Characteristics**

**Figure 3  $V_{CE(sat)}$  vs. Case Temperature**

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

**Figure 5 Capacitance Characteristics**

**Figure 6 Gate Charge Wave Form**


**1200V/75A Trench FS II Fast IGBT**
**Figure 7 Forward Characteristics**

**Figure 8  $V_F$  vs. Temperature**

**Figure 9 Switching Energy vs. Temperature**

**Figure 10 Forward Bias Safe Operating Area**

**Figure 11 Gate-Emitter Threshold Voltage as a Function of Junction Temperature**

**Figure 12 Typical Collector-Emitter Saturation Voltage as a function of Collector Current**




**1200V/75A Trench FS II Fast IGBT**
**Figure 13 Switching Loss vs.  $R_G$** 

**Figure 14 Switching Loss vs. Collector Current**

**Figure 15 Switching Loss vs. Collector Current**

**Figure 16  $P_{tot}$  vs. Case Temperature**

**Figure 17  $V_{CES}$  vs. Case Temperature**

**Figure 18  $I_C$  vs. Temperature**


**1200V/75A Trench FS II Fast IGBT**
**Figure 19  $I_c$  vs. Temperature**

**Figure 20 Switching Time vs.  $R_G$** 

**Figure 21 Switching Loss vs.  $V_{CE}$** 

**Figure 22 Switching Loss vs.  $R_G$** 


**1200V/75A Trench FS II Fast IGBT**
**TO-247P-4L Package Information**


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.83	5.21	0.19	0.21
A1	2.29	2.54	0.09	0.10
A2	1.91	2.16	0.08	0.09
b	1.07	1.33	0.04	0.05
b1	2.39	2.94	0.09	0.12
b3	1.07	1.60	0.04	0.06
b5	2.39	2.69	0.09	0.11
c	0.55	0.68	0.02	0.03
D	23.30	23.60	0.92	0.93
D1	16.25	17.65	0.64	0.69
D2	0.95	1.25	0.04	0.05
E	15.75	16.13	0.62	0.64
E1	13.10	14.15	0.52	0.56
E2	3.68	5.10	0.14	0.20
E3	1.00	1.90	0.04	0.07
E4	12.38	13.43	0.49	0.53
e	2.54 BSC		0.10 BSC	
e1	5.08 BSC		0.20 BSC	
L	17.31	17.82	0.68	0.70
L1	3.97	4.37	0.16	0.17
L2	2.35	2.65	0.09	0.10
Q	5.49	6.00	0.22	0.24
T	17.50° REF			
W	3.50° REF			
X	4.00° REF			