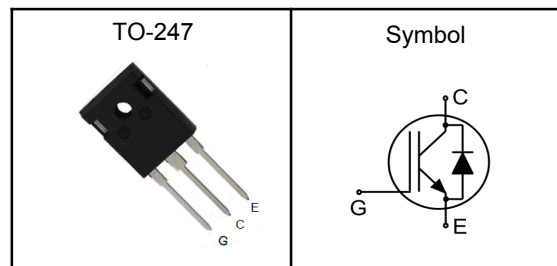


650V/75A Trench FS II Fast IGBT
Features

- 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}	650	V
$V_{CE(sat)-Typ}$	1.7	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}	650	V
Gate- Emitter Voltage	V_{GES}	± 25	V
Collector Current ¹	I_C	150	A
Collector Current ¹	I_C	75	A
Pulsed Collector Current ²	I_{CM}	225	A
Diode Continuous Forward Current	I_F	75	A
Diode Pulsed Forward Current	I_{FM}	225	A
Power Dissipation	P_D	416	W
Power Dissipation	P_D	208	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	$R_{\theta JC}$	---	0.36	$^\circ\text{C/W}$
Thermal Resistance Junction to case for Diode	$R_{\theta JCD}$	---	0.41	$^\circ\text{C/W}$



650V/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}	$V_{GE}=0V, I_C=250\mu A$	650	---	---	V	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=75A,$	$T_J=25^{\circ}\text{C}$	---	1.7	---	V
			$T_J=175^{\circ}\text{C}$	---	2.2	---	V
Gate Threshold Voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}, I_C=1mA$	4.0	5.5	6.5	V	
Collector-Emitter Leakage Current	I_{CES}	$V_{CE}=650V, V_{GE}=0V$	---	---	1	μA	
Gate to Emitter Leakage Current	I_{GES}	$V_{GE}=\pm 25V, V_{CE}=0V$	---	---	± 100	nA	
Total Gate Charge	Q_g	$V_{CE}=400V,$ $V_{GE}=15V, I_C=75A$	---	285	---	nC	
Gate to Emitter Charge	Q_{ge}		---	58	---	nC	
Gate to Collector Charge	Q_{gc}		---	76	---	nC	
Turn-On Delay Time	$t_{d(ON)}$	$V_{CE}=400V, I_C=75A,$ $V_{GE}=15V, R_g=10\Omega,$ Inductive Load	---	60	---	ns	
Rise Time	t_r		---	160	---		
Turn-Off Delay Time	$t_{d(off)}$		---	274	---		
Fall Time	t_f		---	134	---	mJ	
Turn-On Switching Loss	E_{on}		---	3.85	---		
Turn-Off Switching Loss	E_{off}		---	2.14	---		
Total Switching Loss	E_{ts}	---	5.99	---			
Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V, f=1MHz$	---	4900	---	pF	
Output Capacitance	C_{oes}		---	235	---		
Reverse Transfer Capacitance	C_{res}		---	130	---		

Drain-Source Diode Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Diode Forward Voltage	V_F	$I_F=60A, T_C=25^{\circ}\text{C}$	---	1.8	2.4	V
Reverse Recovery Time	t_{rr}	$I_F=75A,$ $di/dt=400A/\mu s, T_C=150^{\circ}\text{C}$	---	145	---	nS
Reverse Recovery Charge	Q_{rr}		---	3.0	---	μC
Diode Peak Reverse Recovery Current	I_{rrm}		---	32	---	A

Note:

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$

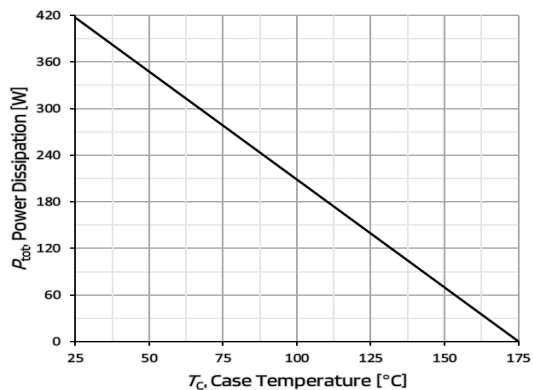
650V/75A Trench FS II Fast IGBT
Typical Characteristics


Figure 1. 功率耗散与壳温关系
($T_{vj} < 175^{\circ}\text{C}$)

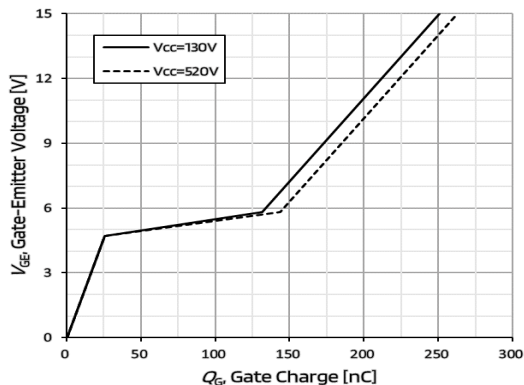


Figure 2. 栅极电荷
($I_c = 75\text{A}$)

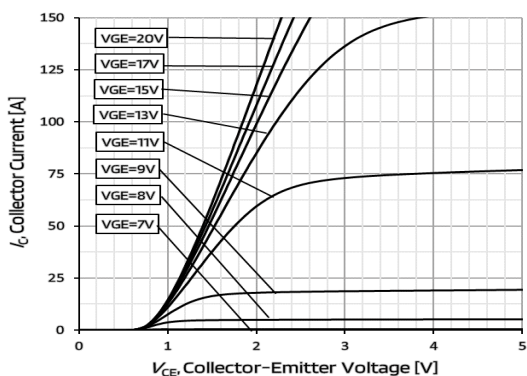


Figure 3. 输出特性

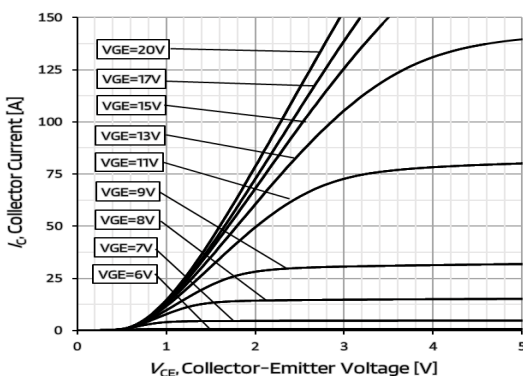


Figure 4. 输出特性
($T_{vj} = 150^{\circ}\text{C}$)

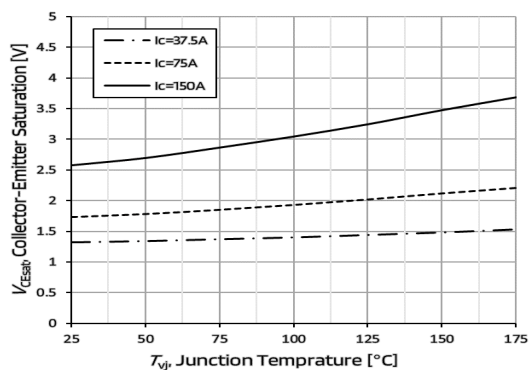


Figure 5. 饱和压降温度特性
($V_{GE} = 1.5\text{V}$)

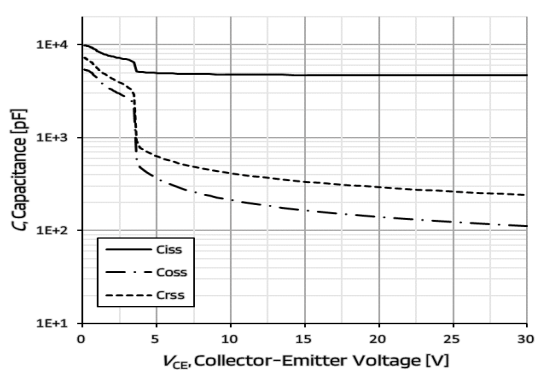


Figure 6. 电容特性
($f = 1\text{MHz}$)

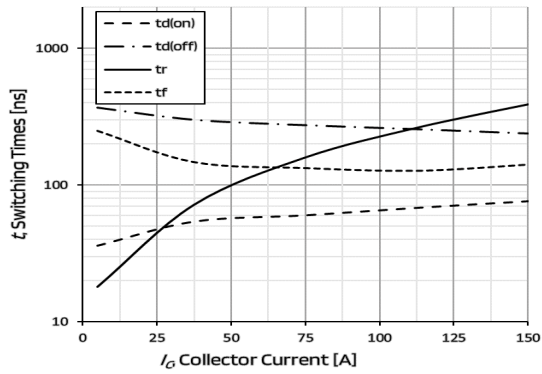
650V/75A Trench FS II Fast IGBT


Figure 7. 开关时间与 I_C 关系
($V_{CE}=400V, V_{GE}=15V, R_G=10\Omega$)

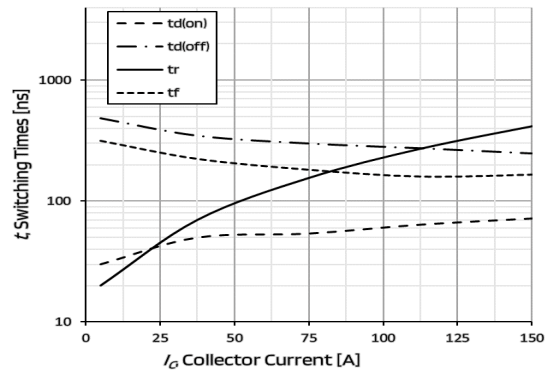


Figure 8. 开关时间与 I_C 关系
($V_{CE}=400V, V_{GE}=15V, R_G=10\Omega, T_{Vj}=150^\circ C$)

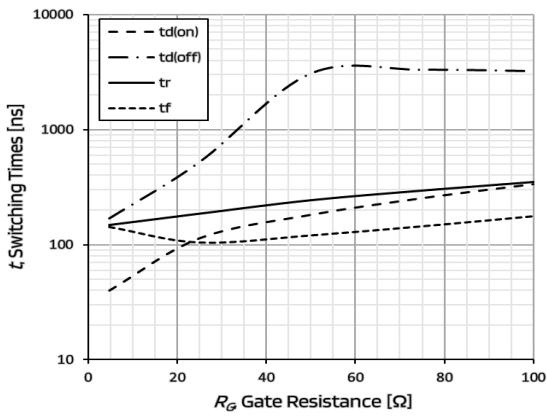


Figure 9. 开关时间与 R_G 关系
($V_{CE}=400V, I_C=75A, V_{GE}=15V$)

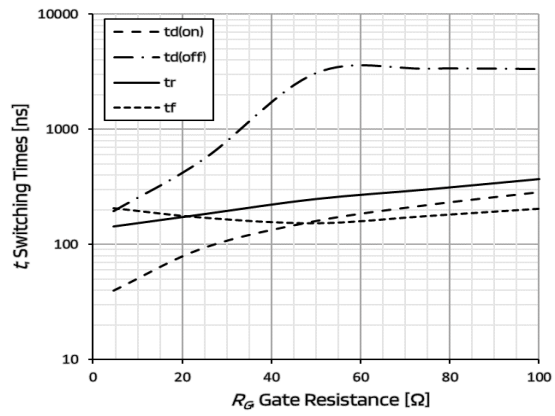


Figure 10. 开关时间与 R_G 关系
($V_{CE}=400V, I_C=75A, V_{GE}=15V, T_{Vj}=150^\circ C$)

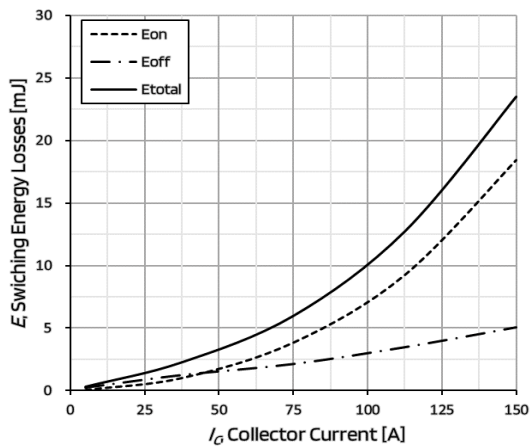


Figure 11. 开关损耗与 I_C 关系
($V_{CE}=400V, V_{GE}=15V, R_G=10\Omega$)

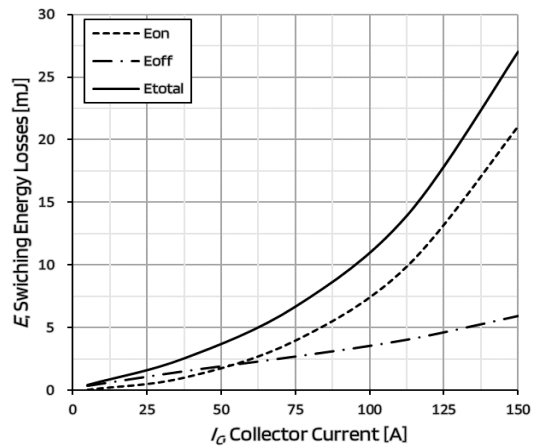


Figure 12. 开关损耗与 I_C 关系
($V_{CE}=400V, V_{GE}=15V, R_G=10\Omega, T_{Vj}=150^\circ C$)

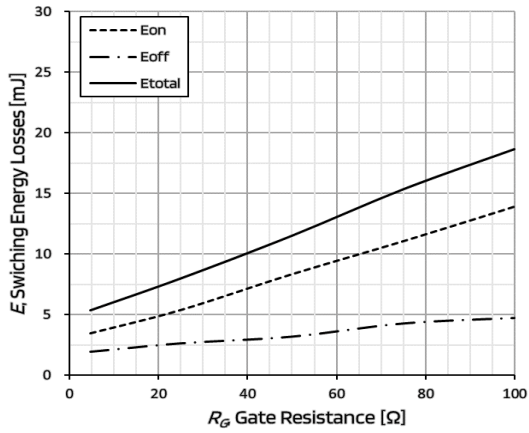
650V/75A Trench FS II Fast IGBT


Figure 13. 开关损耗与 R_G 关系
($V_{CE}=400V, I_c=75A, V_{GE}=15V$)

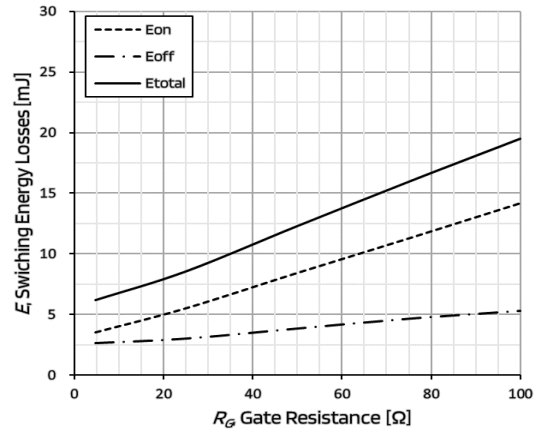


Figure 14. 开关损耗与 R_G 关系
($V_{CE}=400V, I_c=75A, V_{GE}=15V, T_{vj}=150^\circ C$)

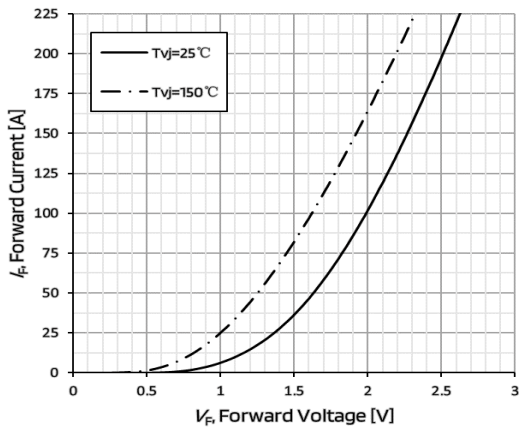


Figure 15. 二极管转移特性

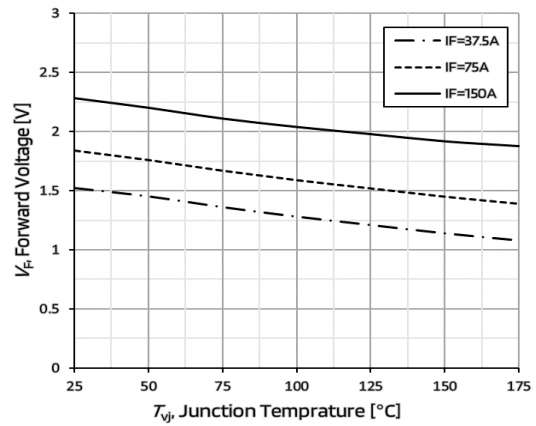
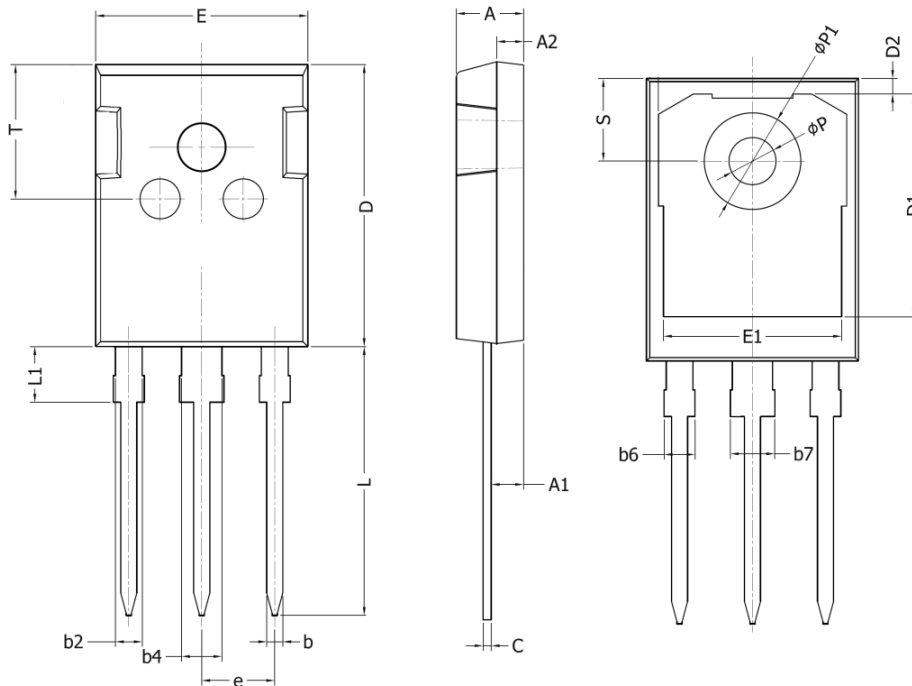


Figure 16. 二极管正向电流温度特性

650V/75A Trench FS II Fast 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