SSCG40BN65GT2

Trench FSII Fast IGBT

➢ Features

V_{CES}	V_{GES}	I_C
650V	±20V	75A@25℃
		40A@100℃

➢ Description

Using trench design and advanced FS (Field Stop) second generation technology, the 650V Trench FSII IGBT offers superior conduction and switching performances, and easy parallel operation.

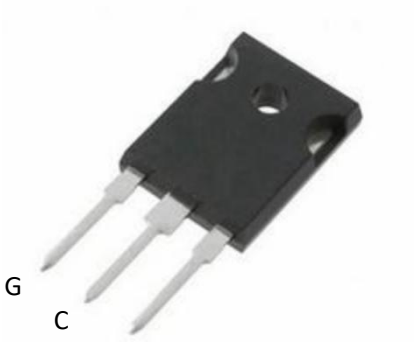
➢ Applications

- PFC Circuits
- UPS
- Solar Inverters

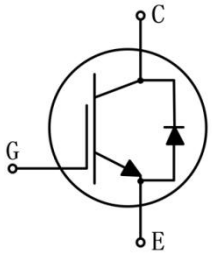
➢ Ordering Information

Device	Package	Shipping
SSCG40BN65GT	TO-247-3L	Tube

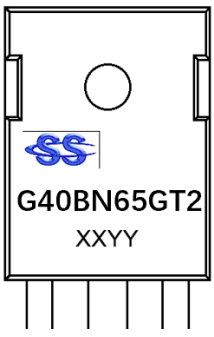
➢ Pin Configuration



TO-247-3L (Top View)



Pin Configuration



Marking

(XXYY: Internal Traceability Code)

➢ Absolute Maximum Ratings (T_{vj}=25℃ unless otherwise noted)

Symbol	Parameter		Ratings	Unit
V_{CES}	Collector-Emitter Voltage		650	V
V_{GES}	Gate-Emitter Voltage		±20	V
I_C	Collector Current	T_C=25℃	75	A
		T_C=100℃	40	
I_{Cpuls}	Pulsed Collector Current, t_p limited by T_{vJmax}		160	A
P_D	Power Dissipation [a]	T_C=25℃	347	W
		T_C=100℃	139	
T_J	Operating Junction and Storage Temperature Range		-40~150	℃
T_{STG}	Operating Junction and Storage Temperature Range		-55~150	℃

➢ Thermal Resistance Ratings

Symbol	Parameter	Typ	Unit
$R_{\theta JA}$	Junction-to-Ambient Thermal Resistance	29	℃/W
$R_{\theta JC}$	Thermal Resistance, Junction to Case for IGBT	0.36	
$R_{\theta JC}$	Thermal Resistance, Junction to Case for Diode	1.06	

➢ Electrical Characteristics of IGBT (T_{vj}=25℃ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	V_{GE} = 0V, I_C = 0.25mA	650			V
I_{CES}	Collector-Emitter Leakage Current	V_{GE}=0V, V_{CE}=650V, T_{vj}=25℃			1	uA
$I_{GES(F)}$	Gate to Emitter Forward Leakage	V_{GE} = +20V, V_{CE} = 0V			100	nA
$I_{GES(R)}$	Gate to Emitter Reverse Leakage	V_{GE} = -20V, V_{CE} = 0V			-100	nA
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C=40A, V_{GE}=15V, T_{vj}=25℃		1.9		V
		I_C=40A, V_{GE}=15V, T_{vj}=150℃		2.3		V
$V_{GE(th)}$	Gate Threshold Voltage	I_C = 1mA, V_{CE} = V_{GE}		5.0		V
C_{ies}	Input Capacitance	V_{CE} = 30V, V_{GE} = 0V, f = 1MHz		2445		pF
C_{oes}	Output Capacitance			86		
C_{res}	Reverse Transfer Capacitance			15		
$T_{D(ON)}$	Turn-on delay time	T_{vj}=25℃, V_{CC}=400V, I_C=40A, V_{GE}=0/15V, R_g=10Ω, Inductive Load		22		ns
T_r	Rise time			35		
$T_{D(OFF)}$	Turn-off delay time			106		
T_f	Fall time			36		
E_{on}	Turn-On Switching Loss			1.26		mJ
E_{off}	Turn-Off Switching Loss			0.45		
E_{ts}	Total Switching Loss			1.71		
$T_{D(ON)}$	Turn-on delay time	T_{vj}=150℃, V_{CC}=400V, I_C=40A, V_{GE}=0/15V, R_g=10Ω, Inductive Load		22		ns
T_r	Rise time			41		
$T_{D(OFF)}$	Turn-off delay time			123		
T_f	Fall time			57		
E_{on}	Turn-On Switching Loss			1.51		mJ
E_{off}	Turn-Off Switching Loss			0.67		
E_{ts}	Total Switching Loss			2.18		
Q_G	Total Gate Charge	V_{CC} = 520V, I_C = 40A, V_{GE} = 0/15V		76		nC

➢ Electrical Characteristics of Diode (T_{vj}=25℃ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode forward voltage	I_F=40A, T_{vj}=25℃		1.70		V
		I_F=40A, T_{vj}=150℃		1.6		V
T_{rr}	Diode reverse recovery time	V_R=400V I_F=40A d_{iF}/d_t=450A/μs T_{vj}=25℃		187		ns
I_{rrm}	Diode peak reverse recovery current			10		A
Q_{rr}	Diode reverse recovery charge			0.85		μC
T_{rr}	Diode reverse recovery time	V_R=400V I_F=40A d_{iF}/d_t=450A/μs T_{vj}=150℃		297		ns
I_{rrm}	Diode peak reverse recovery current			15		A
Q_{rr}	Diode reverse recovery charge			2.1		μC

➢ Typical Performance Characteristics (T_{vj}=25℃ unless otherwise noted)

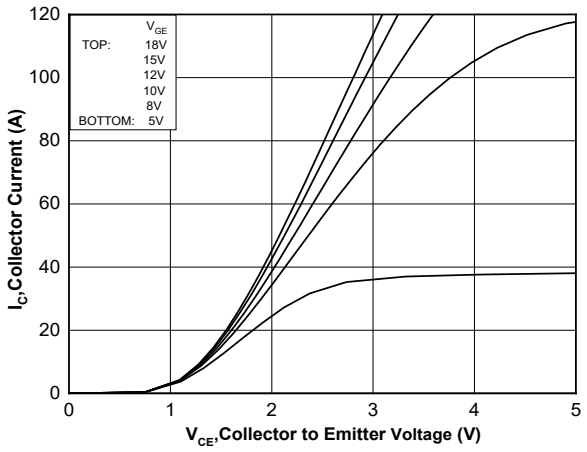


Fig 1. Typical output characteristic (T_{vj}=25℃)

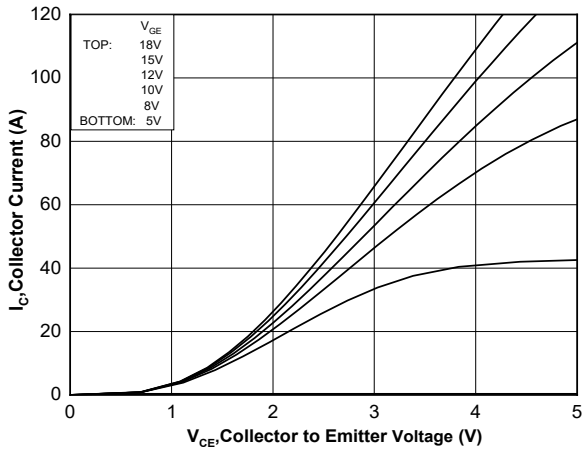


Fig 2. Typical output characteristic(T_{vj}=150℃)

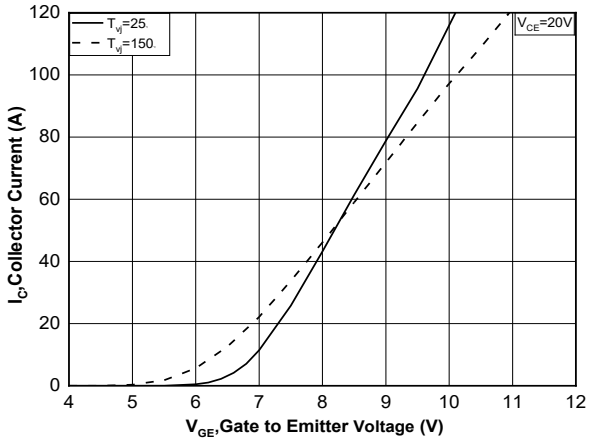


Figure 3. Typical transfer characteristic

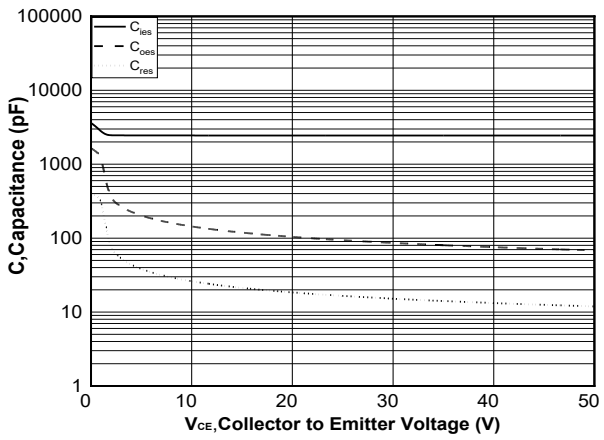


Figure 4. Capacitance characteristic (V_{GE}=0V, f=1MHz)

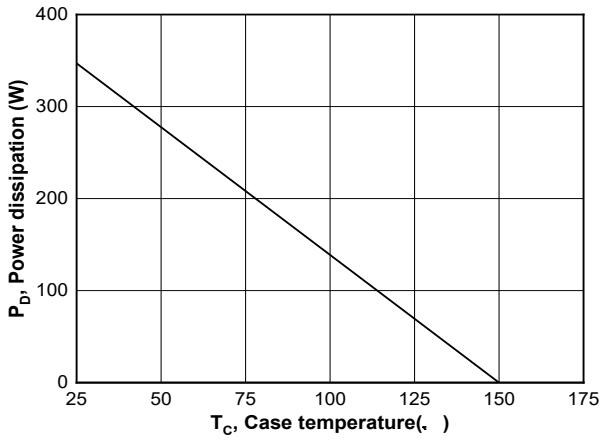


Figure 5. Power dissipation as a function of case temperature (T_J≤150℃)

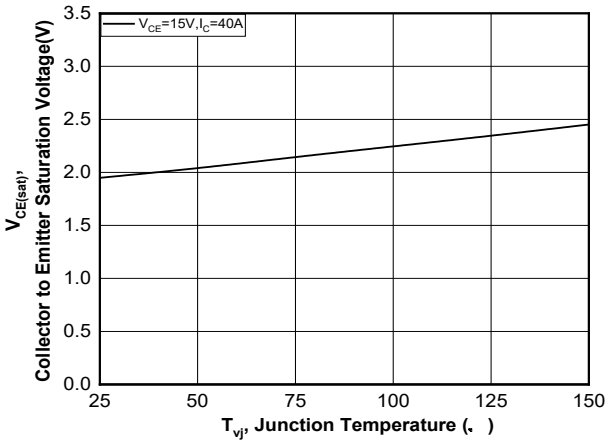


Figure 6. $V_{CE(SAT)}$ as a function of junction temperature (V_{GE}=15V)

➢ Typical Performance Characteristics (T_{vj}=25℃ unless otherwise noted)

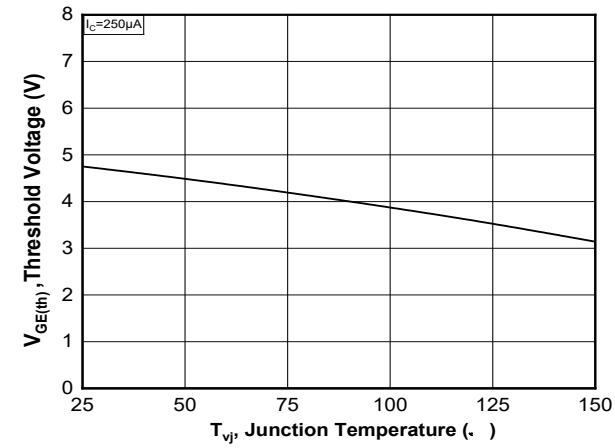


Figure 7.$V_{GE(TH)}$ as a function of junction temperature (I_{CE}=250μA)

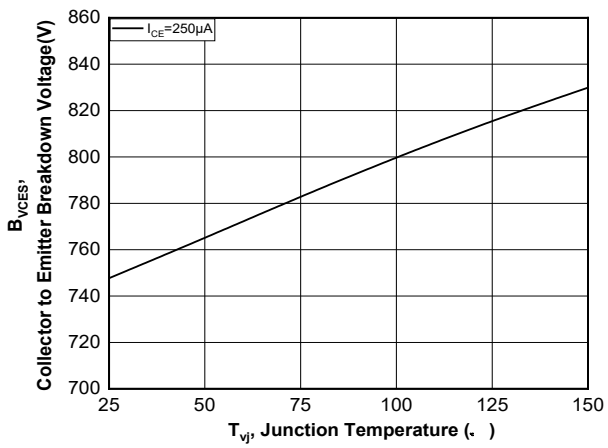


Figure 8. BV_{CES} as a function of junction temperature (I_{CE}=250μA)

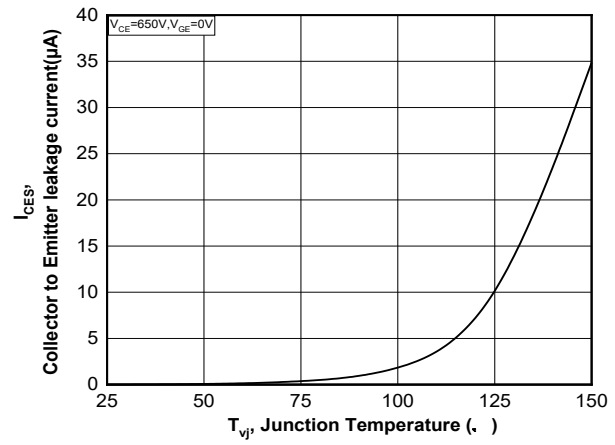


Figure 9. I_{CES} leakage current as a function of junction temperature

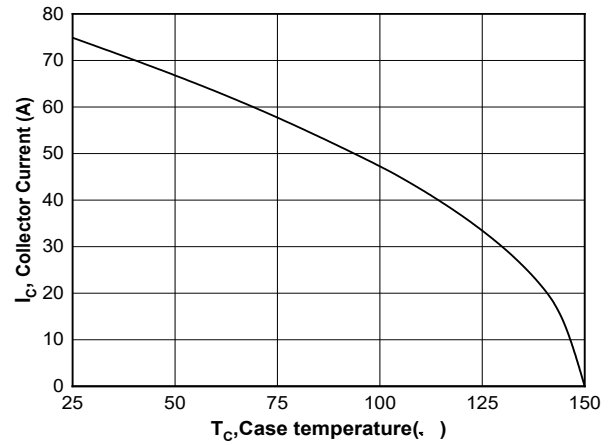


Figure 10. Collector current as a function of case temperature(V_{GE}≥15V,T_J≤150℃)

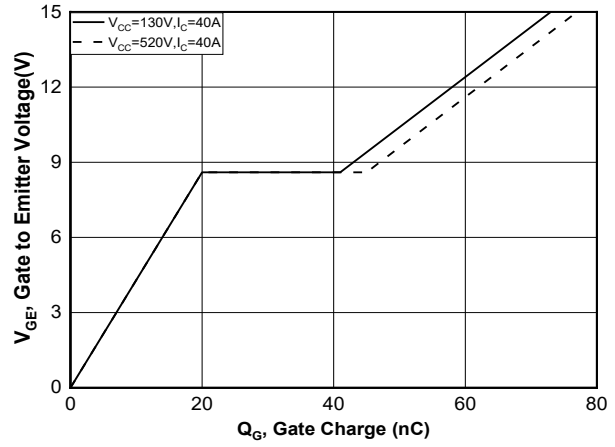


Figure 11. Typical gate charge

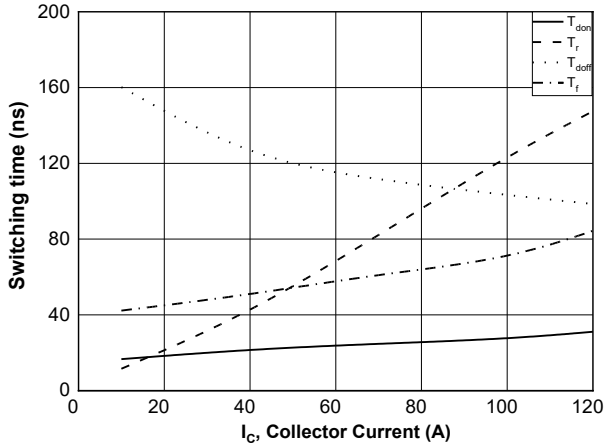


Figure 12. Typical switching times as a function of collector current (T_J=150℃, V_{CE}=400V, $RG_{(on)}$=$RG_{(off)}$=10Ω, V_{GE}=0/15V)

➢ Typical Performance Characteristics (T_{vj}=25℃ unless otherwise noted)

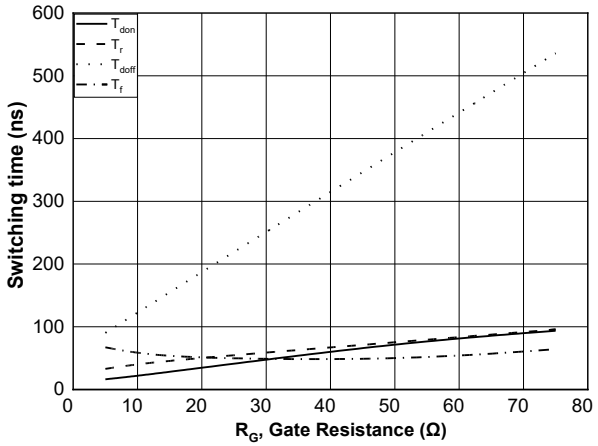


Figure 13. Typical switching times as a function of gate resistance (T_J=150℃, V_{CE}=400V, I_C=40A,V_{GE}=0/15V)

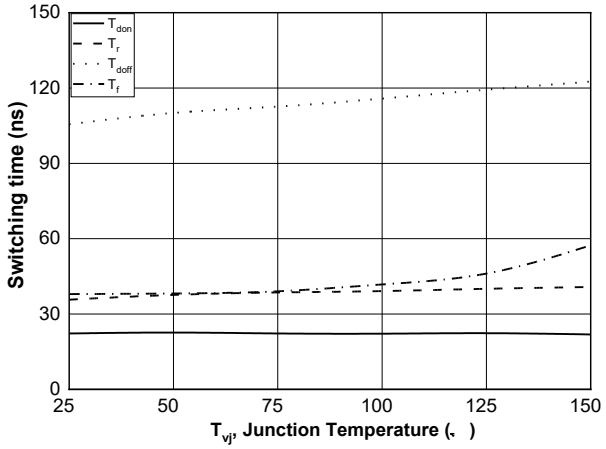


Figure 14. Typical switching times as a function of junction temperature (V_{CE}=400V, I_C=40A, $R_{G(on)}$=$R_{G(off)}$=10Ω, V_{GE}=0/15V)

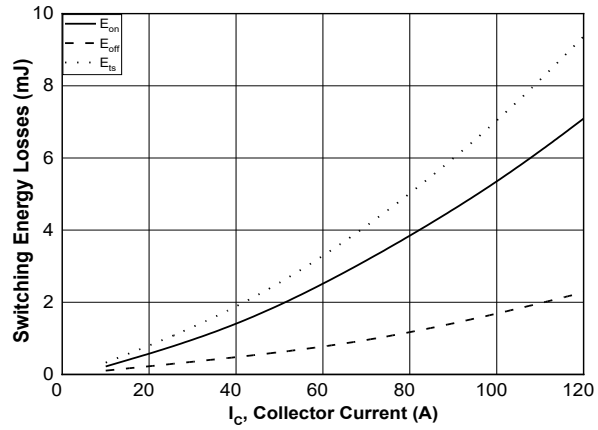


Figure 15. E_{on}, E_{off} as a function of I_C (T_J=25℃, V_{CE}=400V, $RG_{(on)}$=$RG_{(off)}$=10Ω, V_{GE}=0/15V)

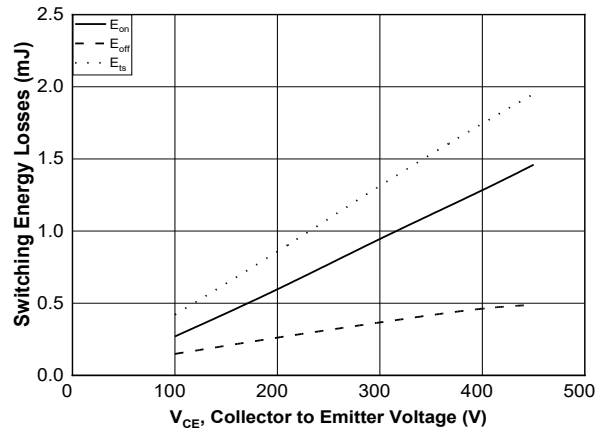


Figure 16. E_{on}, E_{off} as a function of V_{CE} (T_J=25℃, I_C=40A, $R_{G(on)}$=$R_{G(off)}$=10Ω, V_{GE}=0/15V)

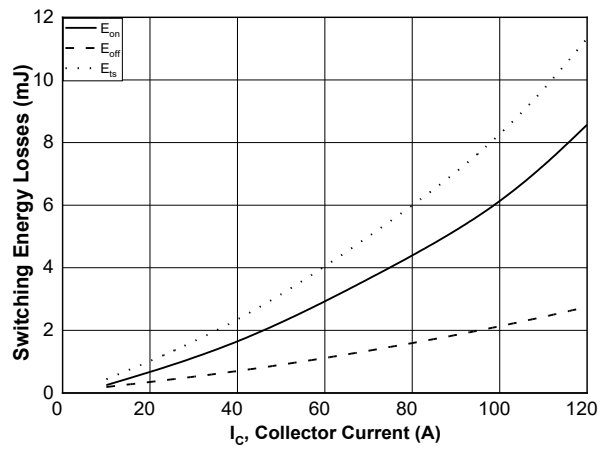


Figure 17. E_{on}, E_{off} as a function of I_C (T_J=150℃, V_{CE}=400V, $RG_{(on)}$=$RG_{(off)}$=10Ω, V_{GE}=0/15V)

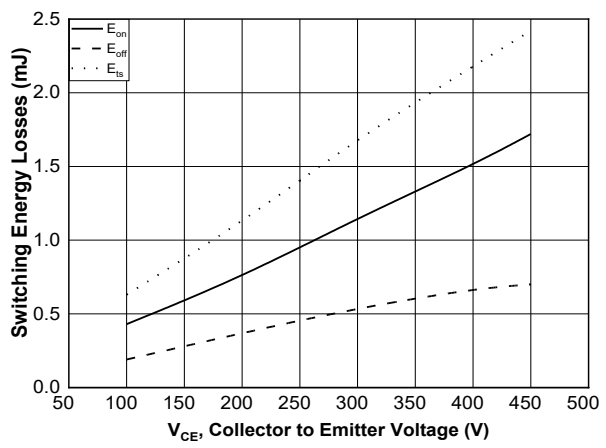


Figure 18. E_{on}, E_{off} as a function of V_{CE} (T_J=150℃, I_C=40A, $R_{G(on)}$=$R_{G(off)}$=10Ω,V_{GE}=0/15V)

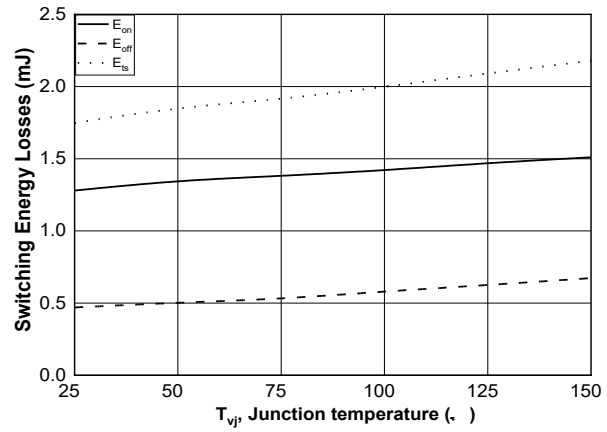


Figure 19. E_{on},E_{off} as a function of junction temperature (V_{CE}=400V, I_C=40A, $R_{G(on)}$=$R_{G(off)}$=10Ω,V_{GE}=0/15V)

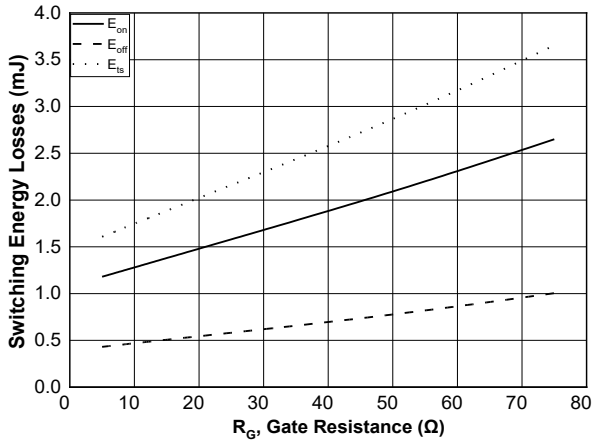


Figure 20. E_{on},E_{off} as a function of gate resistance (T_J=25℃,V_{CE}=400V, I_C=40A, V_{GE}=0/15V)

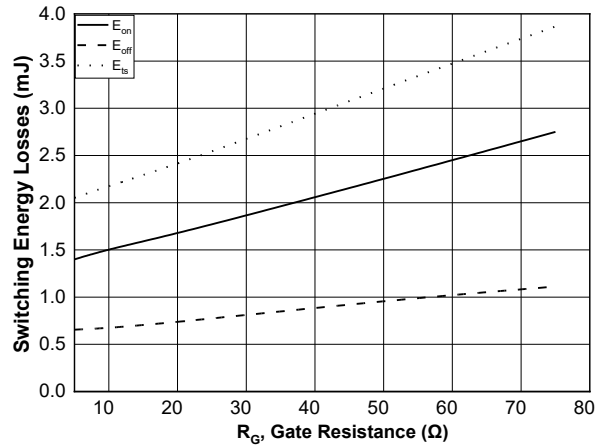


Figure 21. E_{on},E_{off} as a function of gate resistance (T_J=150℃,V_{CE}=400V, I_C=40A, V_{GE}=0/15V)

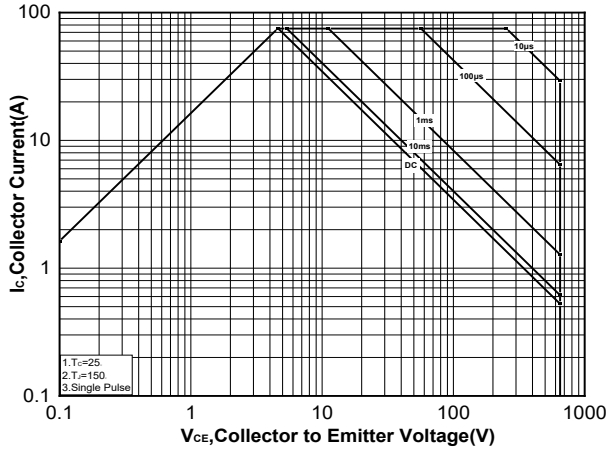


Figure 22. Forward bias safe operating area

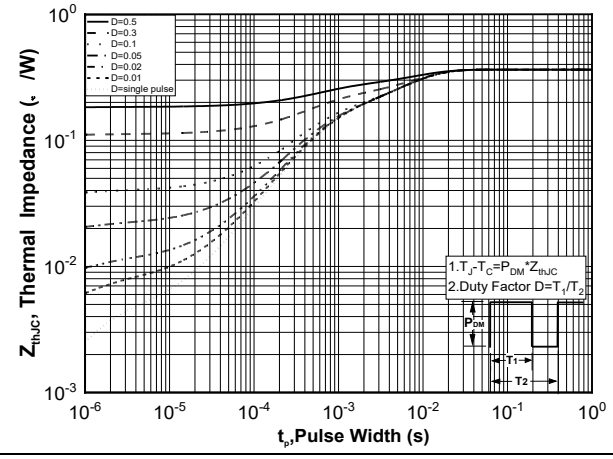


Figure 23. IGBT Transient thermal resistance

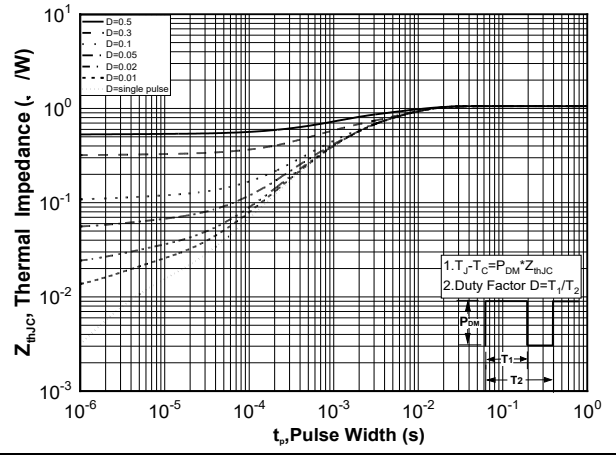
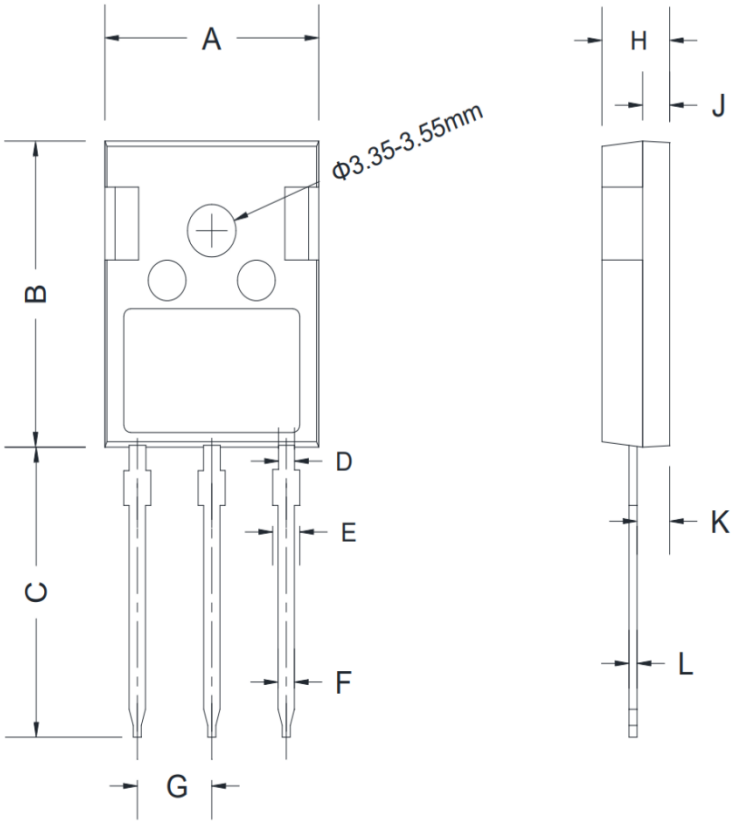


Figure 24. FRD transient thermal resistance

➢ Package Information

TO-247



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.50	15.80	16.10	0.610	0.622	0.634
B	20.80	21.00	22.20	0.819	0.827	0.835
C	19.70	20.00	20.30	0.776	0.787	0.799
D	1.80	2.00	2.20	0.071	0.079	0.087
E	1.90	2.10	2.30	0.075	0.083	0.091
F	1.00	1.20	1.40	0.039	0.047	0.055
G	-	5.44	-	-	0.214	-
H	4.80	5.00	5.20	0.189	0.197	0.205
J	1.90	2.00	2.10	0.075	0.079	0.083
K	2.20	2.35	2.50	0.087	0.093	0.098
L	0.41	0.60	0.79	0.016	0.024	0.031

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