



SSC65TR40BNGT2

Trench FSII Fast IGBT

➤ Features

V_{CES}	V_{GES}	I_c
650V	$\pm 20V$	80A@25°C
		40A@100°C

➤ Description

- High efficiency for inverters.
- High ruggedness performance.
- RoHS compliant.

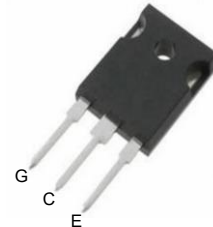
➤ Applications

- PFC Circuits
- Welding machines

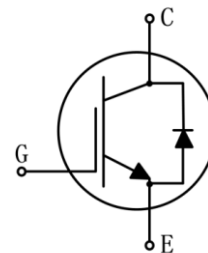
➤ Ordering Information

Device	Package	Shipping
SSC65TR40BNGT2	TO-247-3L	30/Tube

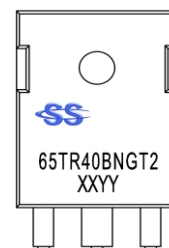
➤ Pin Configuration



TO-247-3L (Top View)



Pin Configuration



Marking

(XXYY: Internal Traceability Code)



SSC65TR40BNGT2

➤ Absolute Maximum Ratings ($T_{vj}=25^{\circ}\text{C}$ 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	$T_C=25^{\circ}\text{C}$	80	A
		$T_C=100^{\circ}\text{C}$	40	
I_{Cpuls}	Pulsed Collector Current, t_p limited by T_{vjmax}		160	A
P_D	Power Dissipation ^a	$T_C=25^{\circ}\text{C}$	300	W
		$T_C=100^{\circ}\text{C}$	150	
T_J	Operating Junction and Storage Temperature Range		-40~175	$^{\circ}\text{C}$
T_{STG}	Operating Junction and Storage Temperature Range		-55~150	$^{\circ}\text{C}$

➤ Thermal Resistance Ratings

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JA}$	Junction-to-Ambient Thermal Resistance		40	$^{\circ}\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance, Junction to Case for IGBT		0.5	
$R_{\theta JC}$	Thermal Resistance, Junction to Case for Diode		0.9	

Note:

- a. The maximum current rating is package limited.



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➤ Electrical Characteristics of IGBT (T_{vj}=25°C 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°C			50	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°C		1.9		V
		I _C =40A, V _{GE} =15V, T _{vj} =150°C		2.3		V
V _{GE(th)}	Gate Threshold Voltage	I _C = 1mA, V _{CE} = V _{GE}	4.0	5.0	6.0	V
C _{ies}	Input Capacitance	V _{CE} = 30V, V _{GE} = 0V, f = 1MHz		2480		pF
C _{oes}	Output Capacitance			95		
C _{res}	Reverse Transfer Capacitance			21		
T _{D(ON)}	Turn-on delay time	T _{vj} =25°C, V _{CC} =400V, I _C =40A, V _{GE} =0/15V, R _g =10Ω, Inductive Load		32		ns
T _r	Rise time			55		
T _{D(OFF)}	Turn-off delay time			106		
T _f	Fall time			51		
E _{on}	Turn-On Switching Loss			0.9		mJ
E _{off}	Turn-Off Switching Loss			0.5		
E _{ts}	Total Switching Loss			1.4		
T _{D(ON)}	Turn-on delay time	T _{vj} =150°C, V _{CC} =400V, I _C =40A, V _{GE} =0/15V, R _g =10Ω, Inductive Load		28		ns
T _r	Rise time			52		
T _{D(OFF)}	Turn-off delay time			128		
T _f	Fall time			75		
E _{on}	Turn-On Switching Loss			0.9		mJ
E _{off}	Turn-Off Switching Loss			0.9		
E _{ts}	Total Switching Loss			1.8		
Q _G	Total Gate Charge	V _{CC} = 520V, I _C = 40A, V _{GE} = 0/15V		78		nC



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➤ **Electrical Characteristics of Diode ($T_{vj}=25^{\circ}\text{C}$ unless otherwise noted)**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
VF	Diode forward voltage	IF=40A, $T_{vj}=25^{\circ}\text{C}$		2.4		V
		IF=40A, $T_{vj}=150^{\circ}\text{C}$		1.8		V
Trr	Diode reverse recovery time	VR=400V IF=40A diF/dt=1200A/ μs $T_{vj}=25^{\circ}\text{C}$		68		ns
Irrm	Diode peak reverse recovery current			15		A
Qrr	Diode reverse recovery charge			522		nC
Trr	Diode reverse recovery time	VR=400V IF=40A diF/dt=1200A/ μs $T_{vj}=150^{\circ}\text{C}$		106		ns
Irrm	Diode peak reverse recovery current			24		A
Qrr	Diode reverse recovery charge			1423		nC

➤ Typical Performance Characteristics ($T_{vj}=25^{\circ}\text{C}$ unless otherwise noted)

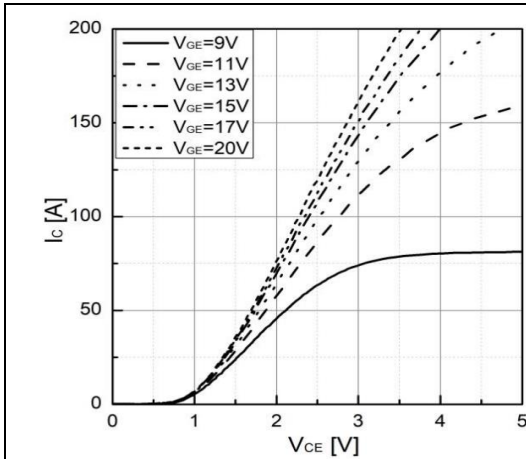


Fig 1. Typical output characteristic ($T_{vj}=25^{\circ}\text{C}$)

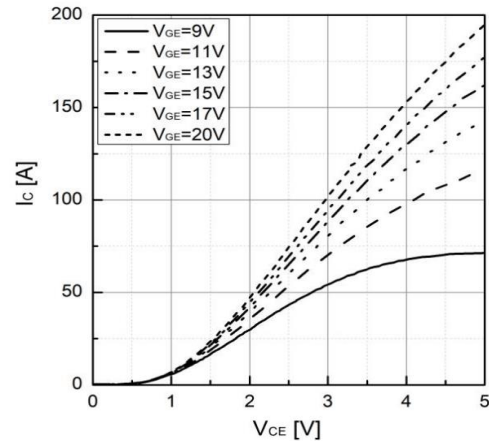


Fig 2. Typical output characteristic ($T_{vj}=150^{\circ}\text{C}$)

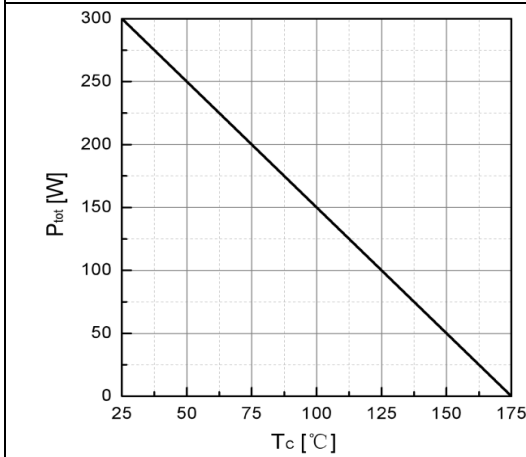


Fig 3. Power dissipation as a function of TC

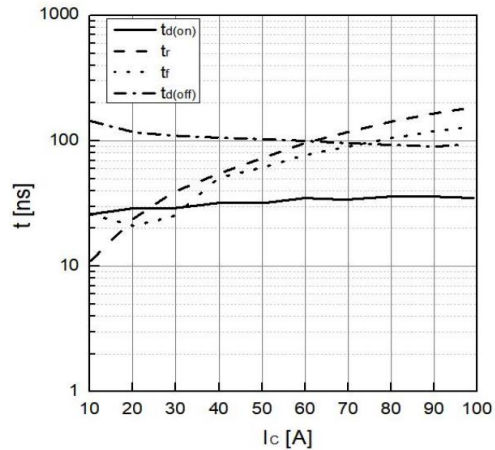


Fig 4. Typical switching time as a function of I_c

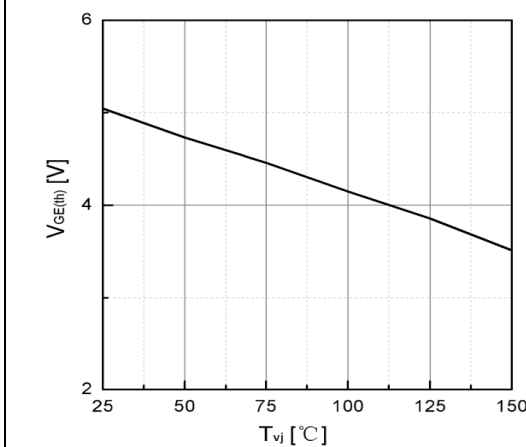


Fig 5. Typical $V_{GE(th)}$ as a function of T_{vj}
($I_c=1\text{mA}$)

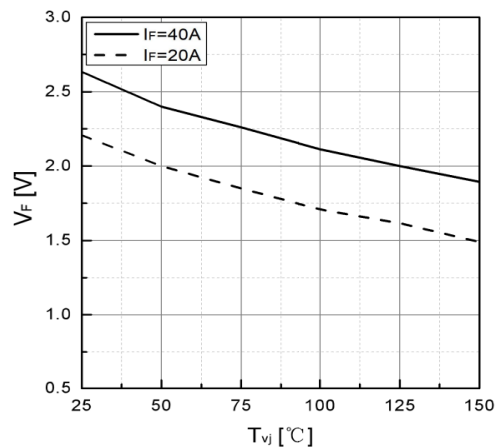


Fig 6. Typical V_F as a function of T_{vj}

➤ Typical Performance Characteristics ($T_{vj}=25^{\circ}\text{C}$ unless otherwise noted)

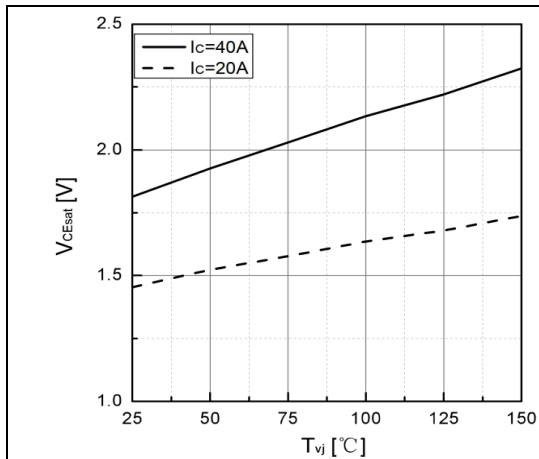


Fig 7. Typical V_{CEsat} as a function of T_{vj}

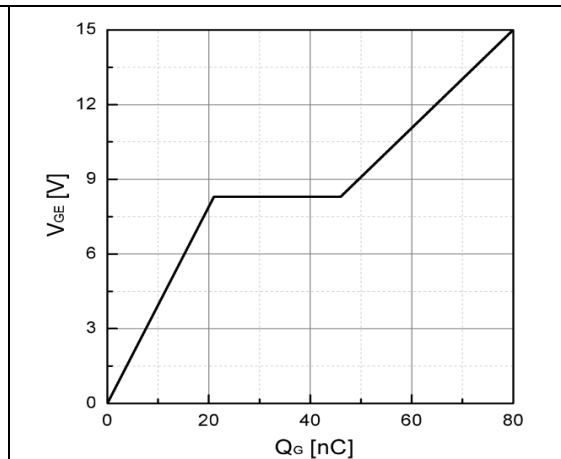


Fig 8. Typical Gate charge

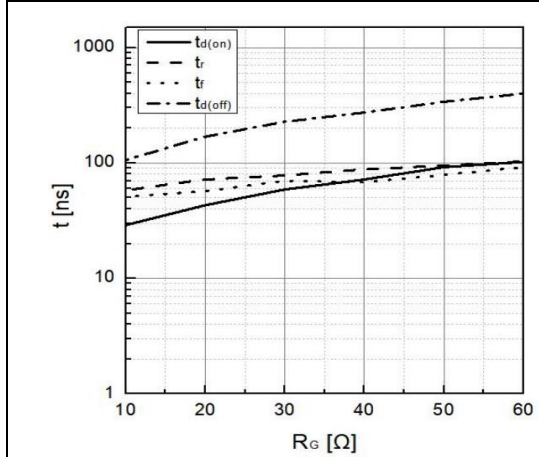


Fig 9. Typical switching times as a function of R_G

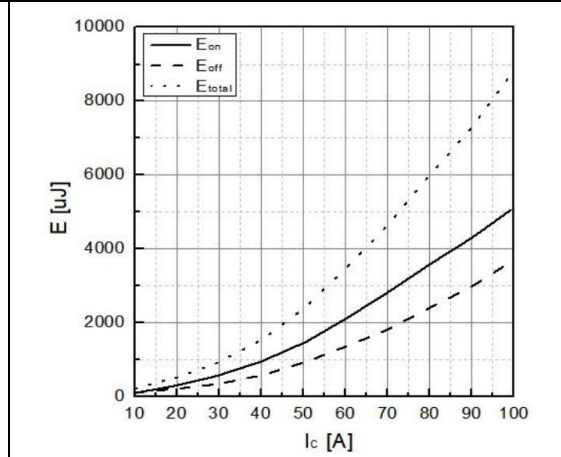


Fig 10. Typical switching energy losses as a function of I_c

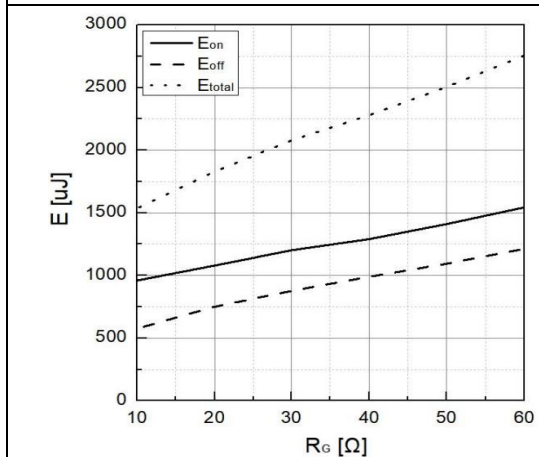


Fig 11. Typical switching energy losses as a function of R_G

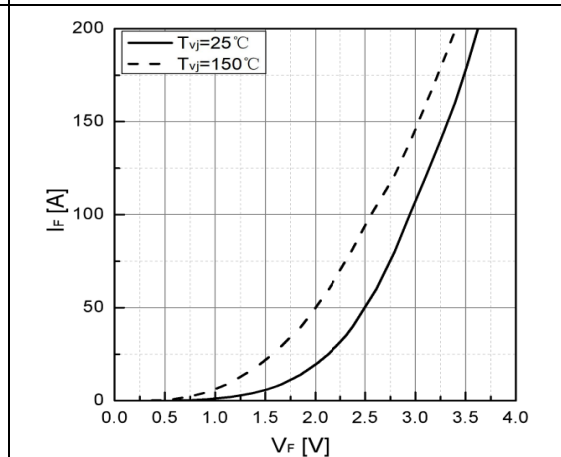


Fig 12. Typical I_F as a function of V_F

➤ Typical Performance Characteristics ($T_{vj}=25^{\circ}\text{C}$ unless otherwise noted)

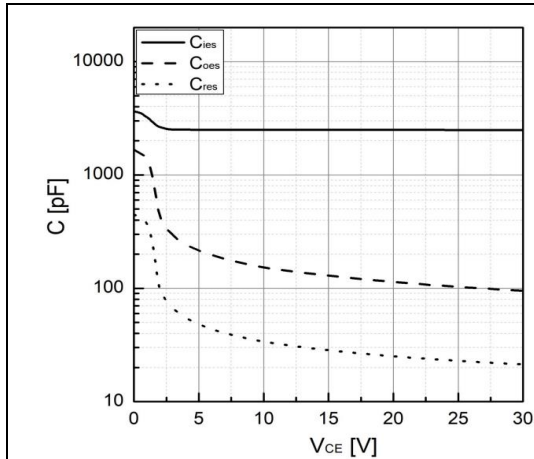


Fig 13. Typical capacitance as a function of VCE
($f=1\text{Mhz}$, $V_{GE}=0\text{V}$)

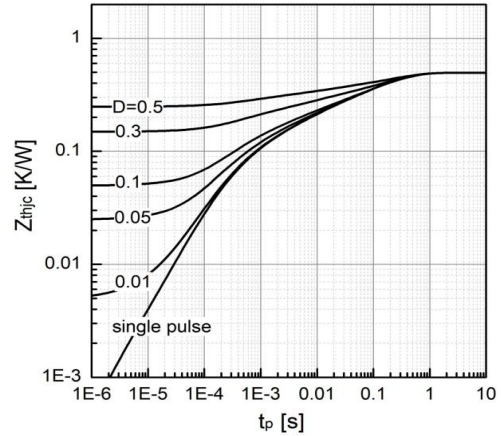
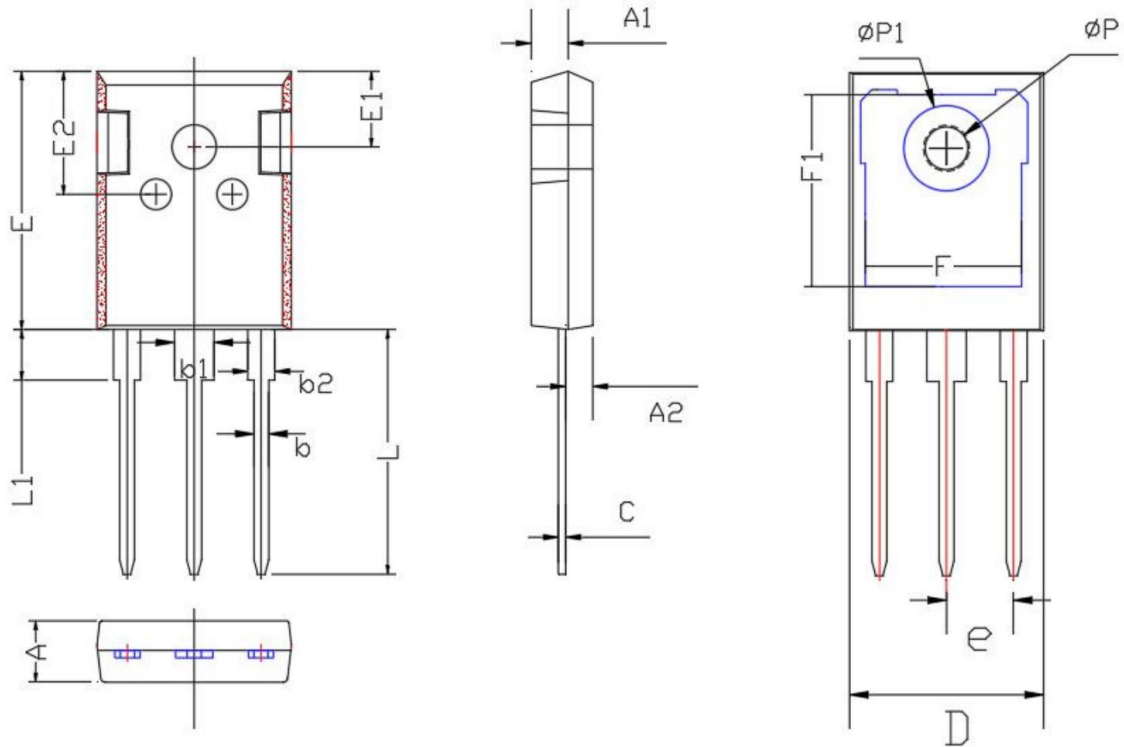


Fig 14. Transient thermal impedance of IGBT

➤ Package Information

TO247



Symbol	MILL IMETER			Symbol	MILL IMETER		
	Min	Nom	Max		Min	Nom	Max
A	4.80	5.00	5.20	E1	5.60	5.80	6.20
A1	3.30	3.50	3.70	E2	9.8	10.0	10.2
A2	2.20	2.40	2.60	e	5.25	5.45	5.65
b	1.00	1.20	1.40	F	13.1	13.4	13.7
b1	2.90	3.10	3.30	F1	16.25	16.55	16.85
b2	1.90	2.10	2.30	L	19.5	20.0	20.5
c	0.50	0.60	0.71	L1	4.00	4.20	4.40
D	15.2	15.7	16.2	P	3.30	3.50	3.80
E	20.8	21	21.2	P1	6.80	7.10	7.40



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