SKIS75N65-T7

Trench Field stop Fast IGBT Co-packed half rated with Thin SiC Schottky Diode

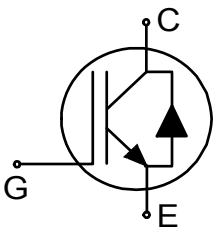
Type	V_{CE}	I_C	V_{CEsat}, T_{vj}=25°C	T_{vjmax}	Package
SKIS75N65-T7	650V	75A	1.69V	175°C	TO-247

Features and Benefits

- Low switching losses due to the combination of trench field stop fast IGBT and thin SiC Schottky Diode
- Better efficiency and cost balance than SiC MOSFET solution
- High ruggedness

Applications

- Charger
- Solar inverter
- Energy storage
- Industrial UPS



	Parameter		**Unit**
V_{CE}	Max Collector-Emitter Voltage	650	V
$I_{C(Nominal)}$	Max DC Collector Current	75	A
V_f	SiC Schottky Diode Typical Forward Voltage at 30A	1.35	V
Q_c	SiC Schottky Diode Total Capacitive Charge	51.8	nC

Maximum Ratings

	Parameter	Min.	Typ.	Max.	Unit
$V_{(BR)CES}$	Collector-to-Emitter Breakdown Voltage	650	—	—	V
I_C	DC collector current limited by T_{jmax} T_c = 25°C T_c = 100°C	 — —	 150 75	 — —	 A A
I_F	Diode Forward current, limited by T_{jmax} T_c = 25°C T_c = 100°C	 — —	 75 42	 — —	 A A
V_{GE}	Continuous Gate-emitter voltage	-20	—	20	V
V_{GE}	Transient Gate-emitter voltage	-30	—	30	V
I_{Fpulse}	Diode Pulsed Current, t_p limited by T_{jmax} t_P = 10 ms, Half Sine Wave	—	110	—	A
T_{vj}	Operating junction temperature	-40	—	175	°C
T_{stg}	Storage temperature -	-55	—	150	°C

Thermal Resistance

Parameter	Symbol	Max. Value	Unit
IGBT thermal resistance junction - case	$R_{\theta(j-c)}$	0.5	K/W
Diode thermal resistance, junction - case	$R_{\theta(j-c)}$	1	K/W
Thermal resistance, junction - ambient	$R_{\theta(j-a)}$	38	K/W

Static Characteristics. T_J=25°C

	Parameter	Min.	Typ.	Max.	Unit	Conditions
$V_{CE(sat)}$	Collector-to-Emitter Saturated Voltage	 — —	 1.69 2.06	 — —	V	V_{GE} = 15V, I_C =75A T_J=25°C T_J=150°C
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	4.2	5.2	6.2	V	I_C =250uA , V_{GE} = V_{CE}
I_{CES}	Zero Gate Voltage Collector Current	—	—	1	mA	V_{CE} = 650V, V_{GE} = 0V, T_j=25°C
I_{GES}	Gate Emitter Leakage Current	—	—	200	nA	V_{CE} = 0V, V_{GE} =20V
C_{ies}	Input Capacitance	—	1190	—	pF	V_{GE} = 0V, V_{CE}=25V, f=25kHz
C_{oes}	Output Capacitance	—	367	—		
C_{res}	Reverse Transfer Capacitance	—	65	—		
Q_g	Gate charge	—	438	—	nC	V_{CC}=520V,I_C=75A,V_{GE}=15V

Switching Characteristic, Inductive Load (T_J=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Turn-on delay time	$t_{d(on)}$	—	74	—	ns	V_{CC} = 400V, I_C = 37.5A, V_{GE} = 0/15V, R_g=10Ω
Rise time	t_r	—	42	—	ns	
Turn-off delay time	$t_{d(off)}$	—	482	—	ns	
Fall time	t_f	—	24	—	ns	
Turn-on energy Eon	E_{on}	—	0.61	—	mJ	
Turn-off energy	E_{off}	—	0.55	—	mJ	
Total switching energy	E_{ts}	—	1.17	—	mJ	

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Turn-on delay time	$t_{d(on)}$	—	81	—	ns	V_{CC} = 400V, I_C = 75A, V_{GE} = 0/15V, R_g=10Ω
Rise time	t_r	—	99	—	ns	
Turn-off delay time	$t_{d(off)}$	—	450	—	ns	
Fall time	t_f	—	77	—	ns	
Turn-on energy Eon	E_{on}	—	1.99	—	mJ	
Turn-off energy	E_{off}	—	2.05	—	mJ	
Total switching energy	E_{ts}	—	4.04	—	mJ	

Switching Characteristic, Inductive Load (T_J=150°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Turn-on delay time	$t_{d(on)}$	—	70	—	ns	V_{CC} = 400V, I_C = 37.5A, V_{GE} = 0/15V, R_g=10Ω
Rise time	t_r	—	40	—	ns	
Turn-off delay time	$t_{d(off)}$	—	523	—	ns	
Fall time	t_f	—	38	—	ns	
Turn-on energy Eon	E_{on}	—	0.62	—	mJ	
Turn-off energy	E_{off}	—	0.73	—	mJ	
Total switching energy	E_{ts}	—	1.35	—	mJ	

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Turn-on delay time	$t_{d(on)}$	—	77	—	ns	V_{CC} = 400V, I_C = 75A, V_{GE} = 0/15V, R_g=10Ω
Rise time	t_r	—	94	—	ns	
Turn-off delay time	$t_{d(off)}$	—	484	—	ns	
Fall time	t_f	—	78	—	ns	
Turn-on energy Eon	E_{on}	—	1.90	—	mJ	
Turn-off energy	E_{off}	—	2.27	—	mJ	
Total switching energy	E_{ts}	—	4.17	—	mJ	

Diode Characteristic

	Parameter	Min.	Typ.	Max.	Unit	Conditions
V_f	Forward Voltage		1.35		V	I_f=30A, T_J = 25°C
			2.08			I_f=75A, T_J = 25°C
		—	1.68	—		I_f=30A, T_J = 150°C
		—	3.08	—		I_f=75A, T_J = 150°C
Q_c	Total Capacitive Charge	—	51.8	—	nC	V_R=400V
C	Total Capacitance	—	1210	—	pF	V_R=0V, T_J=25°C, f=1MHz
		—	101	—		V_R=200V, T_J=25°C, f=1MHz
		—	90	—		V_R=400V, T_J=25°C, f=1MHz

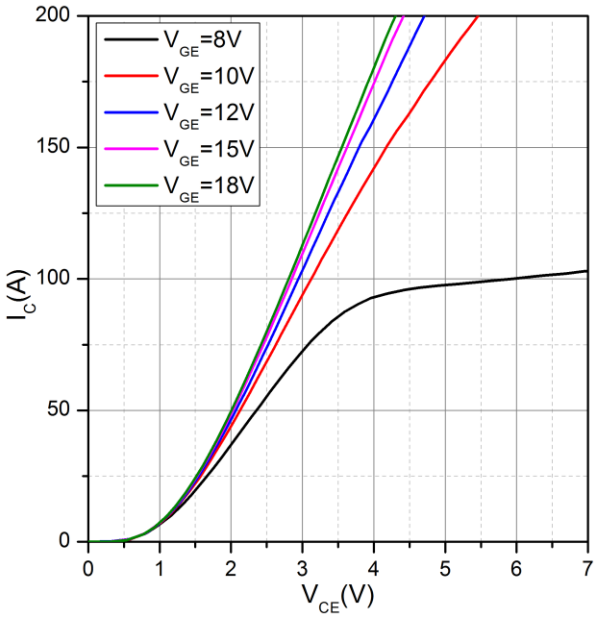


Figure 2. Typical output characersitic(Tvj=150℃)

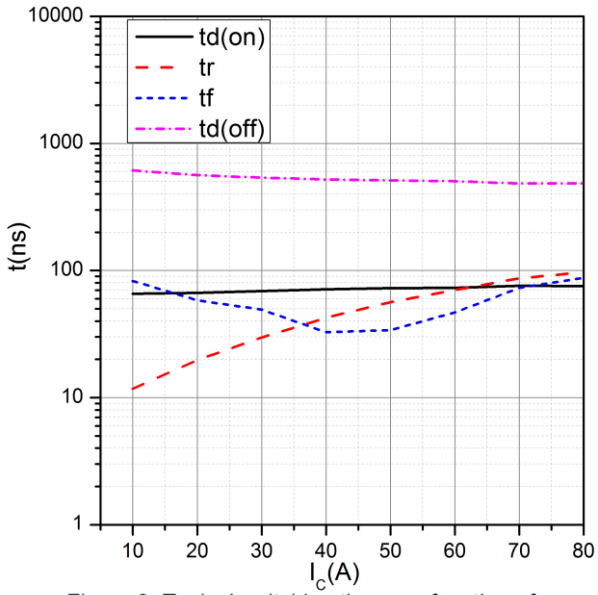


Figure 3. Typical switching times as function of collector current(inductive load,T_{vj}=150℃,V_{CE}=400V, V_{GE}=15/0V,R_G=10Ω,Dynamic test circuit in figure E)

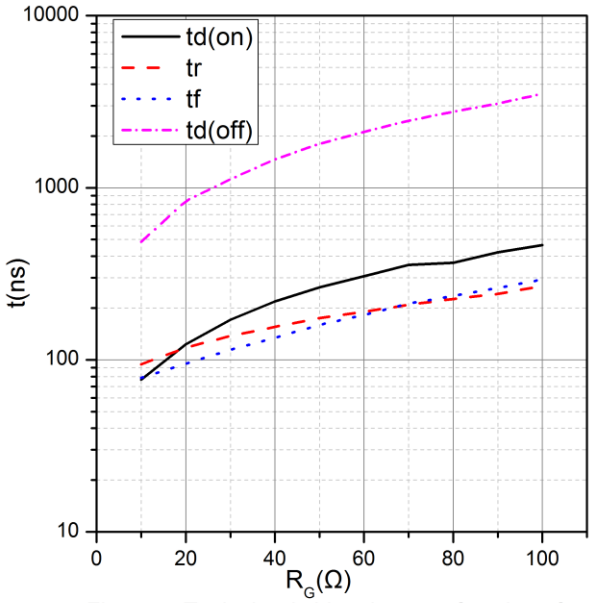


Figure 4. Typical switching times as function of gate resistor(inductive load,T_{vj}=150℃,V_{CE}=400V, V_{GE}=15/0V,I_C=75A,Dynamic test circuit in figure E)

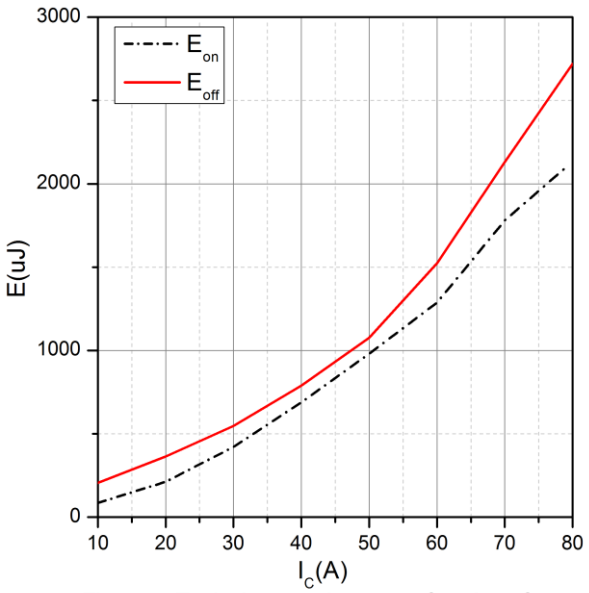


Figure 5. Typical energy losses as function of collector current(inductive load,T_{vj}=150℃,V_{CE}=400V, V_{GE}=15/0V,R_G=10Ω,Dynamic test circuit in figure E)

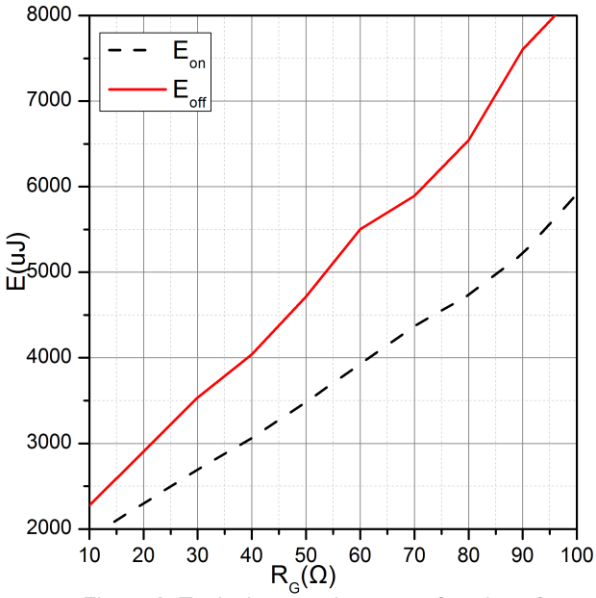


Figure 6. Typical energy losses as function of gate resistor(inductive load,T_{vj}=150℃,V_{CE}=400V, V_{GE}=15/0V,I_C=75A,Dynamic test circuit in figure E)

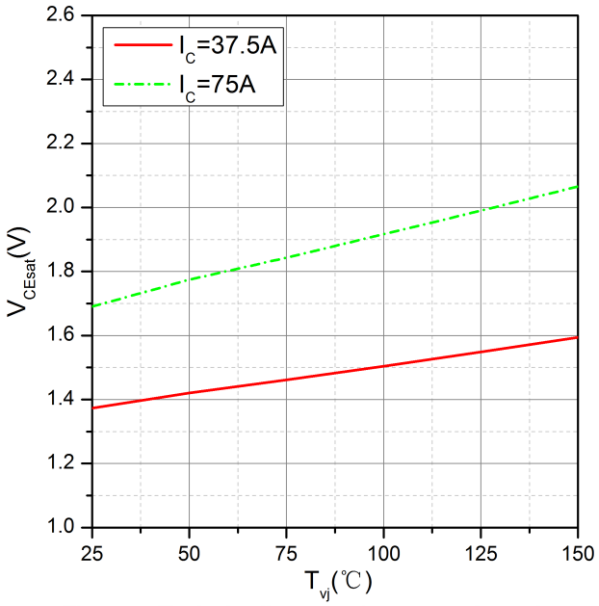


Figure 7. Typical collector-emitter saturation voltage as a function of junction temperature(VGE=15V)

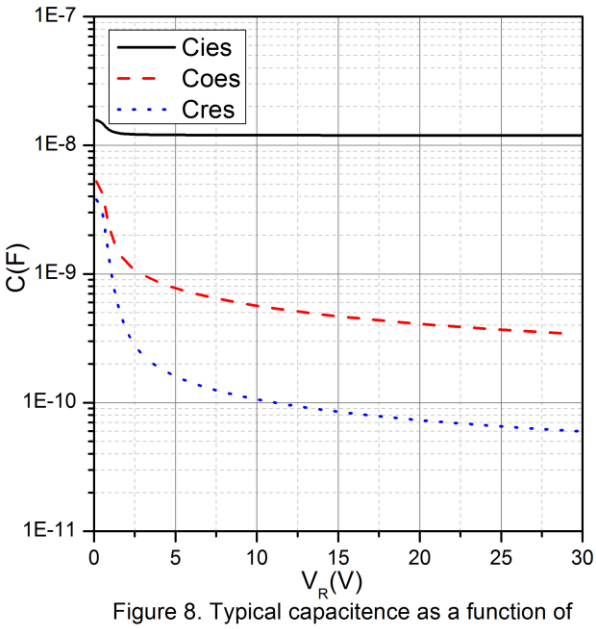


Figure 8. Typical capacitence as a function of collector-emitter voltage(V_{GE}=0V,f=250kHz)

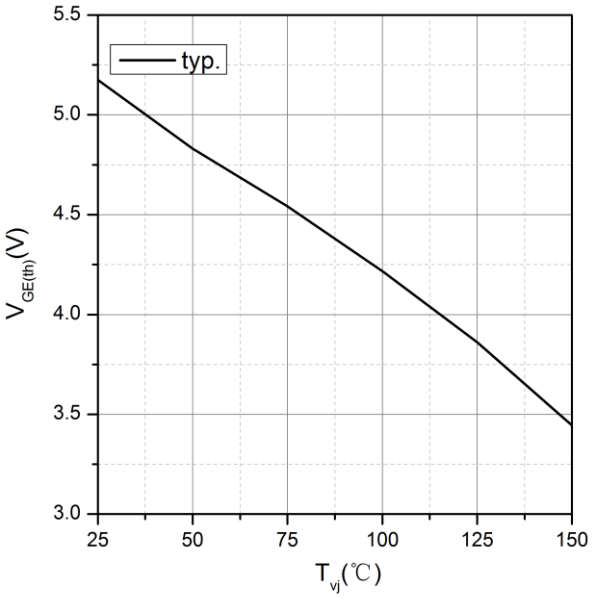


Figure 9. Gate-emitter threshold voltage as a function of junction temperature(I_C=0.25mA)

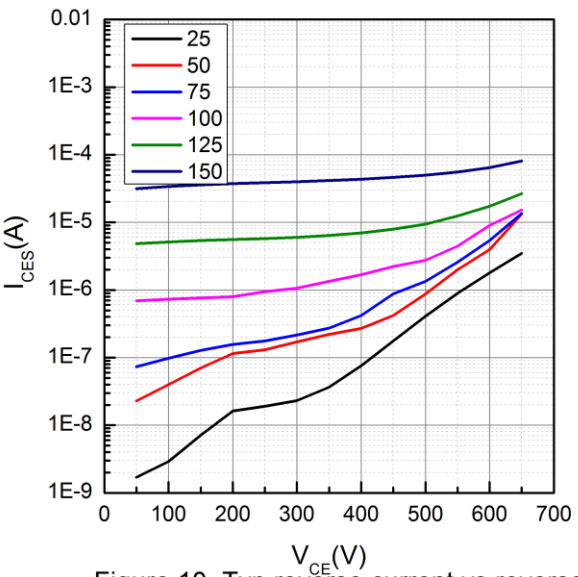


Figure 10. Typ.reverse current vs reverse voltage as a function of Tvj

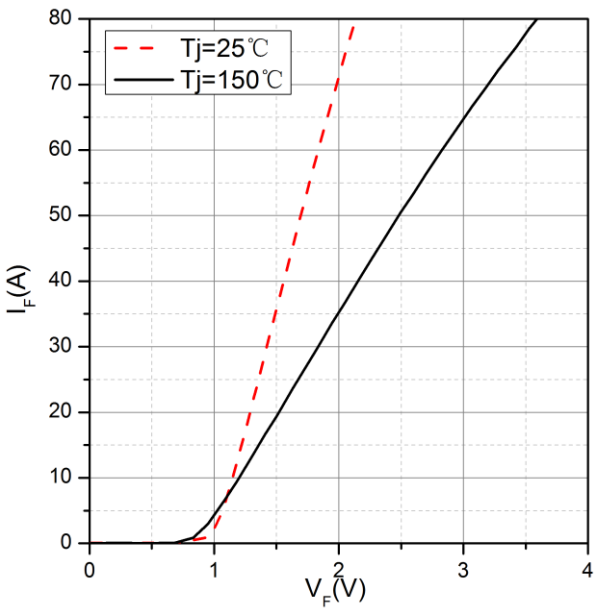


Figure 11. Typical diode forward current as a function of forward voltage

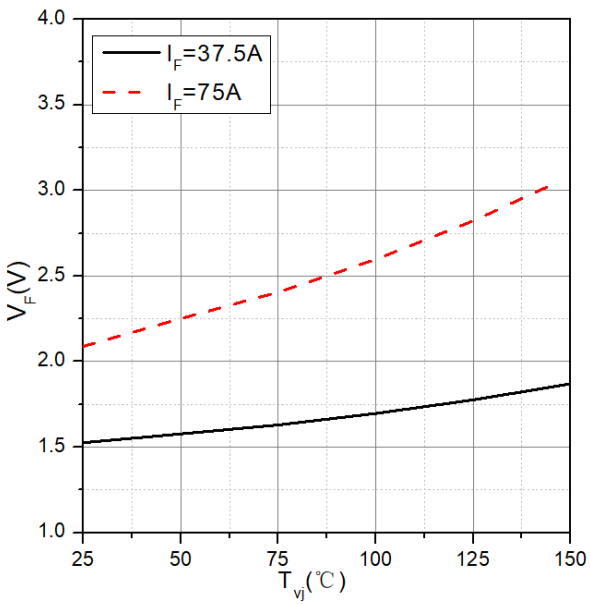
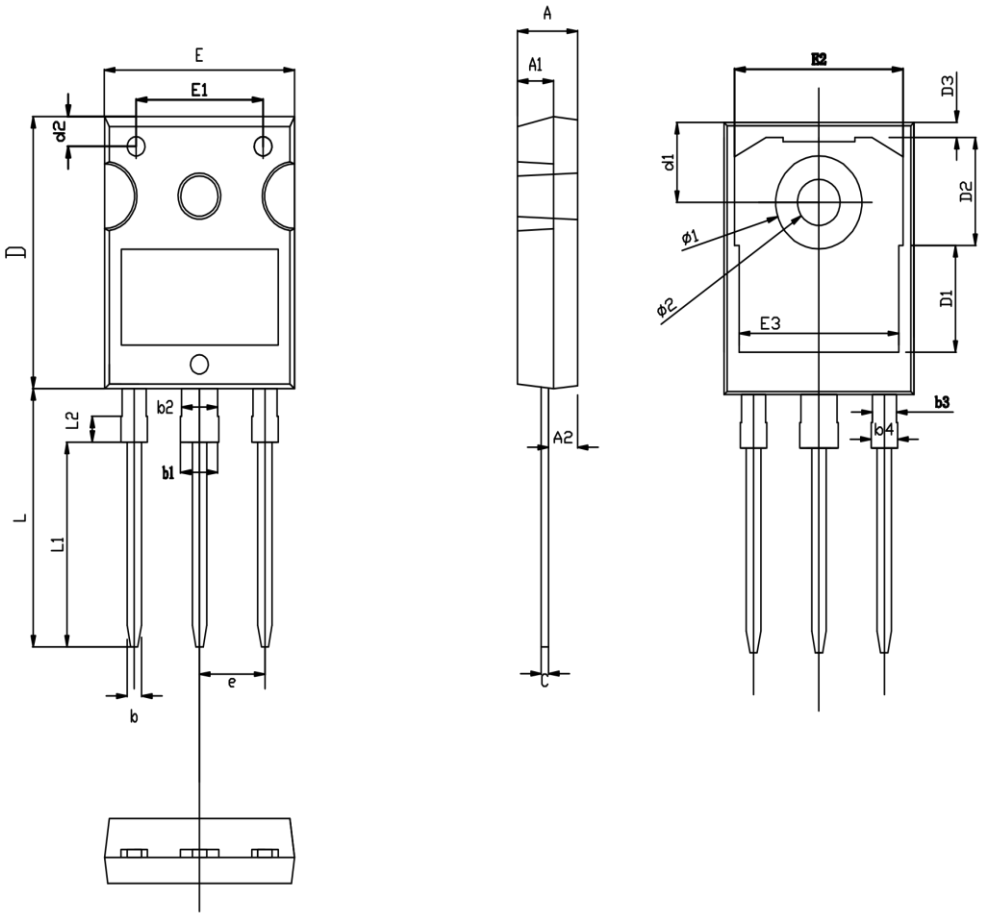
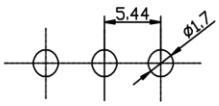


Figure 12. Typical diode forward voltage as a function of junction temperature

TO-247 PACKAGE OUTLINE



RECOMMENDED LAND PATTERN



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