



General Description

OSC50N65KF uses advanced Oriental-Semi's patented Trident-Gate Bipolar Transistor (TGBT™) technology to provide extremely low $V_{CE(sat)}$, low gate charge, and excellent switching performance. This device is suitable for mid to high range switching frequency converters.

Features

- Advanced TGBT™ technology
- Excellent conduction and switching loss
- Excellent stability and uniformity



Applications

- Induction converters
- Uninterruptible power supplies

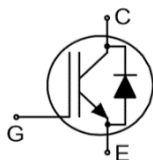
Key Performance Parameters

Parameter	Value	Unit
$V_{CES, min} @ 25^{\circ}C$	650	V
Maximum junction temperature	175	$^{\circ}C$
$I_C, pulse$	200	A
$V_{CE(sat), typ} @ V_{GE}=15V$	1.65	V
Q_g	90	nC

Marking Information

Product Name	Package	Marking
OSC50N65KF	TO263	OSC50N65K

Package & Pin Information



Absolute Maximum Ratings at $T_{vj}=25^{\circ}\text{C}$ unless otherwise noted

Parameter	Symbol	Value	Unit
Collector emitter voltage	V_{CES}	650	V
Gate emitter voltage	V_{GES}	± 20	V
Transient gate emitter voltage, $T_P \leq 10\mu\text{s}$, $D < 0.01$		± 30	V
Continuous collector current ¹⁾ , $T_C = 25^{\circ}\text{C}$	I_C	80	A
Continuous collector current ¹⁾ , $T_C = 100^{\circ}\text{C}$		50	A
Pulsed collector current ²⁾ , $T_C = 25^{\circ}\text{C}$	$I_{C, \text{pulse}}$	200	A
Diode forward current ¹⁾ , $T_C = 25^{\circ}\text{C}$	I_F	80	A
Diode forward current ¹⁾ , $T_C = 100^{\circ}\text{C}$		50	A
Diode pulsed current ²⁾ , $T_C = 25^{\circ}\text{C}$	$I_{F, \text{pulse}}$	200	A
Power dissipation ³⁾ , $T_C = 25^{\circ}\text{C}$	P_D	250	W
Power dissipation ³⁾ , $T_C = 100^{\circ}\text{C}$		125	W
Operation and storage temperature	T_{stg}, T_{vj}	-55 to 175	$^{\circ}\text{C}$

Thermal Characteristics

Parameter	Symbol	Value	Unit
IGBT thermal resistance, junction-case	$R_{\theta JC}$	0.80	$^{\circ}\text{C/W}$
Diode thermal resistance, junction-case	$R_{\theta JC}$	0.67	$^{\circ}\text{C/W}$
Thermal resistance, junction-ambient ⁴⁾	$R_{\theta JA}$	40	$^{\circ}\text{C/W}$

Electrical Characteristics at $T_{vj}=25^{\circ}\text{C}$ unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Collector-emitter breakdown voltage	$V_{(BR)CES}$	650			V	$V_{GE}=0\text{ V}$, $I_C=1\text{ mA}$
Collector-emitter saturation voltage	$V_{CE(sat)}$		1.65	1.8	V	$V_{GE}=15\text{ V}$, $I_C=50\text{ A}$, $T_{vj}=25^{\circ}\text{C}$
			2.04		V	$V_{GE}=15\text{ V}$, $I_C=50\text{ A}$, $T_{vj}=125^{\circ}\text{C}$
			2.24			$V_{GE}=15\text{ V}$, $I_C=50\text{ A}$, $T_{vj}=175^{\circ}\text{C}$
Gate-emitter threshold voltage	$V_{GE(th)}$	3.5	4.5	5.5	V	$V_{CE}=V_{GE}$, $I_D=2\text{ mA}$
Diode forward voltage	V_F		1.22	1.40	V	$V_{GE}=0\text{ V}$, $I_F=50\text{ A}$, $T_{vj}=25^{\circ}\text{C}$
			1.20			$V_{GE}=0\text{ V}$, $I_F=50\text{ A}$, $T_{vj}=125^{\circ}\text{C}$
			1.18			$V_{GE}=0\text{ V}$, $I_F=50\text{ A}$, $T_{vj}=175^{\circ}\text{C}$
Gate-emitter leakage current	I_{GES}			100	nA	$V_{CE}=0\text{ V}$, $V_{GE}=20\text{ V}$
Zero gate voltage collector current	I_{CES}			10	μA	$V_{CE}=650\text{ V}$, $V_{GE}=0\text{ V}$

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{ies}		4400		pF	$V_{GE}=0\text{ V}$, $V_{CE}=25\text{ V}$, $f=100\text{ kHz}$
Output capacitance	C_{oes}		1635		pF	
Reverse transfer capacitance	C_{res}		14		pF	
Turn-on delay time	$t_{d(on)}$		28		ns	$V_{GE}=15\text{ V}$, $V_{CC}=400\text{ V}$, $R_G=10\ \Omega$, $I_C=50\text{ A}$
Rise time	t_r		32		ns	
Turn-off delay time	$t_{d(off)}$		137		ns	
Fall time	t_f		71		ns	
Turn-on energy	E_{on}		2.17		mJ	
Turn-off energy	E_{off}		0.84		mJ	
Turn-on delay time	$t_{d(on)}$		26		ns	$V_{GE}=15\text{ V}$, $V_{CC}=400\text{ V}$, $R_G=10\ \Omega$, $I_C=25\text{ A}$
Rise time	t_r		17		ns	
Turn-off delay time	$t_{d(off)}$		157		ns	
Fall time	t_f		52		ns	
Turn-on energy	E_{on}		1.05		mJ	
Turn-off energy	E_{off}		0.35		mJ	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		90		nC	$V_{GE}=15\text{ V}$, $V_{CC}=520\text{ V}$, $I_C=50\text{ A}$
Gate-emitter charge	Q_{ge}		34		nC	
Gate-collector charge	Q_{gc}		22		nC	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode reverse recovery time	t_{rr}		94		ns	$V_R=400\text{ V}$, $I_F=50\text{ A}$, $di_F/dt=500\text{ A}/\mu\text{s}$ $T_{vj}=25^\circ\text{C}$
Diode reverse recovery charge	Q_{rr}		1.87		μC	
Diode peak reverse recovery current	I_{rrm}		37		A	

Note

- 1) Calculated continuous current based on maximum allowable junction temperature.
- 2) Repetitive rating; pulse width limited by max. junction temperature.
- 3) P_d is based on max. junction temperature, using junction-case thermal resistance.
- 4) The value of $R_{\theta JA}$ is measured with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_a=25^\circ\text{C}$.

Electrical Characteristics Diagrams

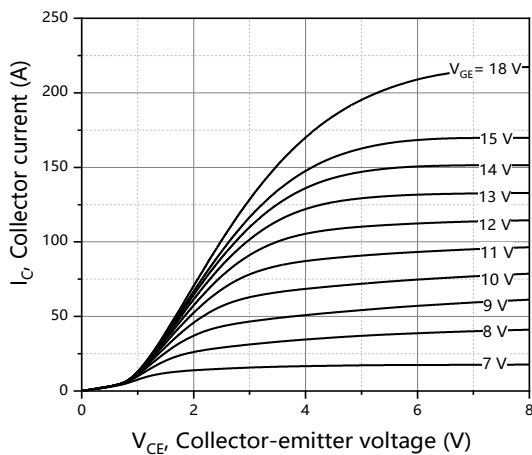


Figure 1. Typical output characteristics
($T_{vj}=25^{\circ}\text{C}$)

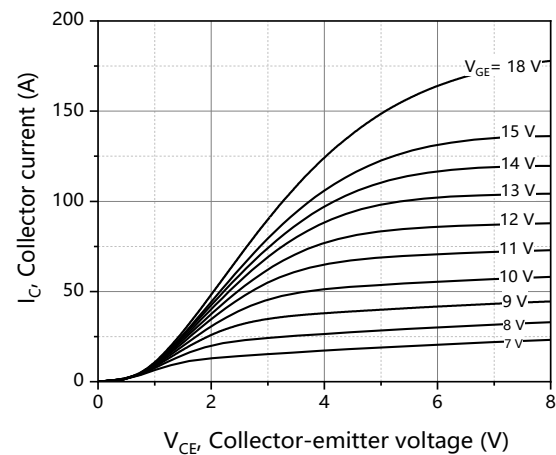


Figure 2. Typical output characteristics
($T_{vj}=150^{\circ}\text{C}$)

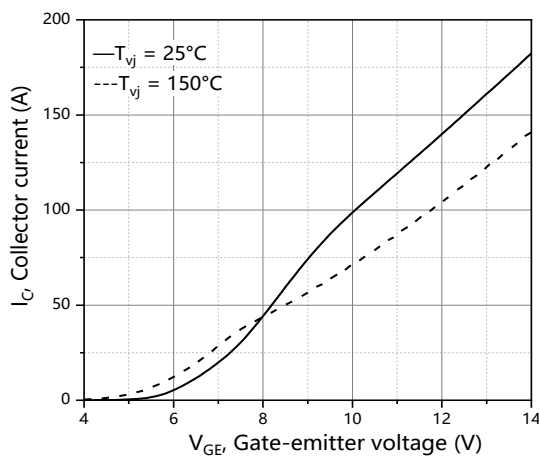


Figure 3. Typical transfer characteristics
($V_{CE}=20\text{ V}$)

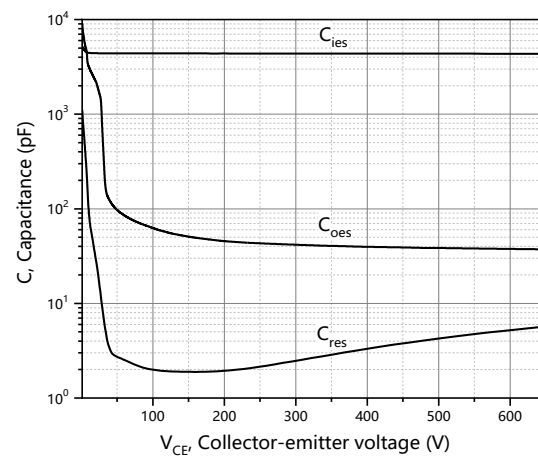


Figure 4. Typical capacitance
($V_{GE}=0\text{V}$, $f=100\text{ kHz}$)

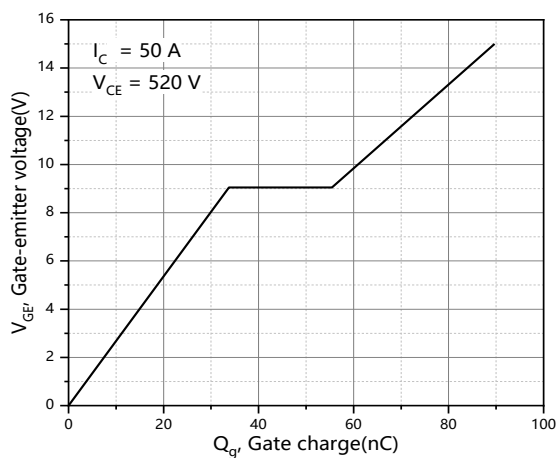


Figure 5. Typical gate charge

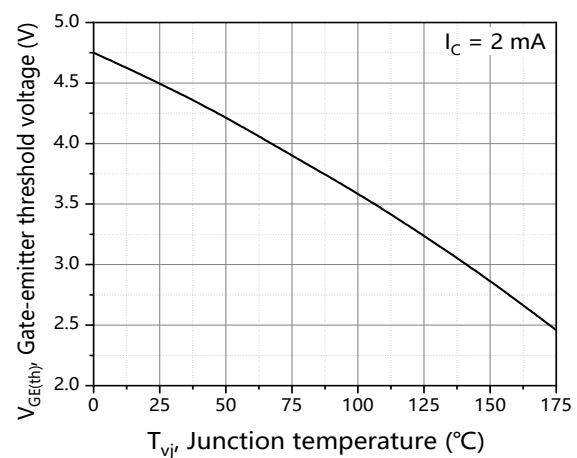


Figure 6. Gate-emitter threshold voltage

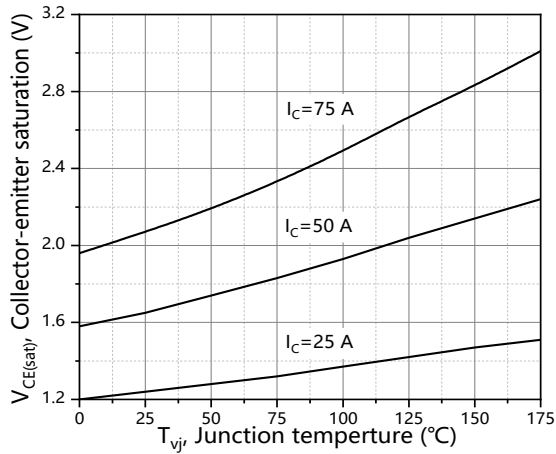


Figure 7. Typical collector-emitter voltage

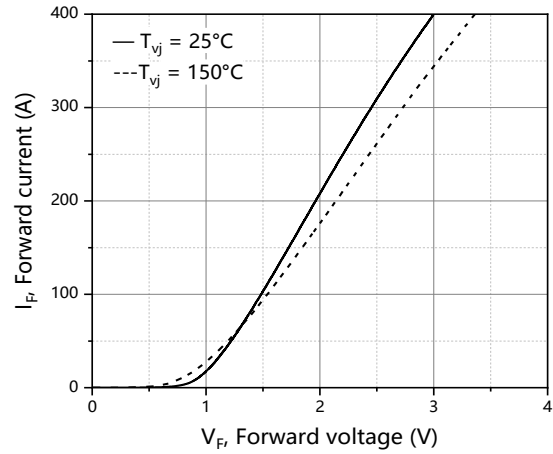


Figure 8. Forward characteristic of diode

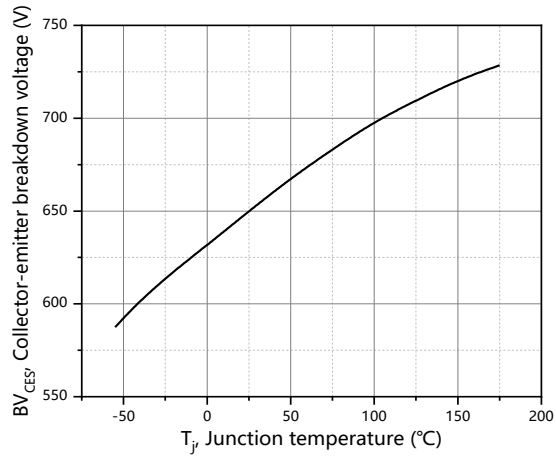


Figure 9. Collector-emitter breakdown voltage

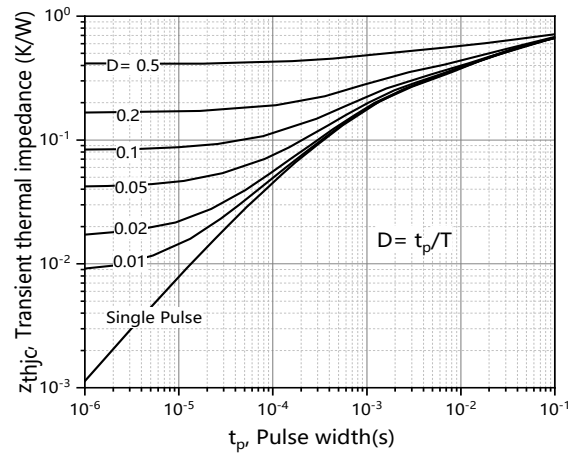


Figure 10. IGBT transient thermal impedance

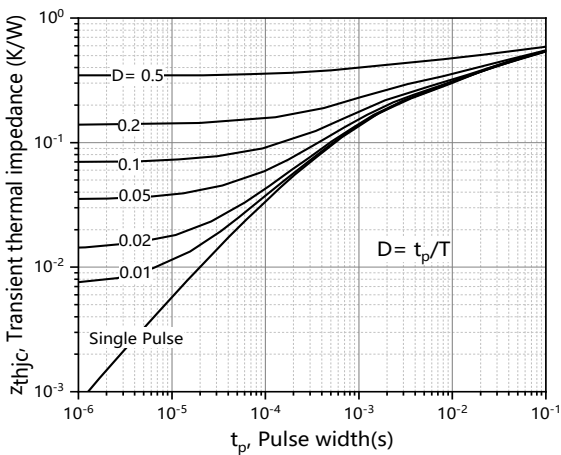
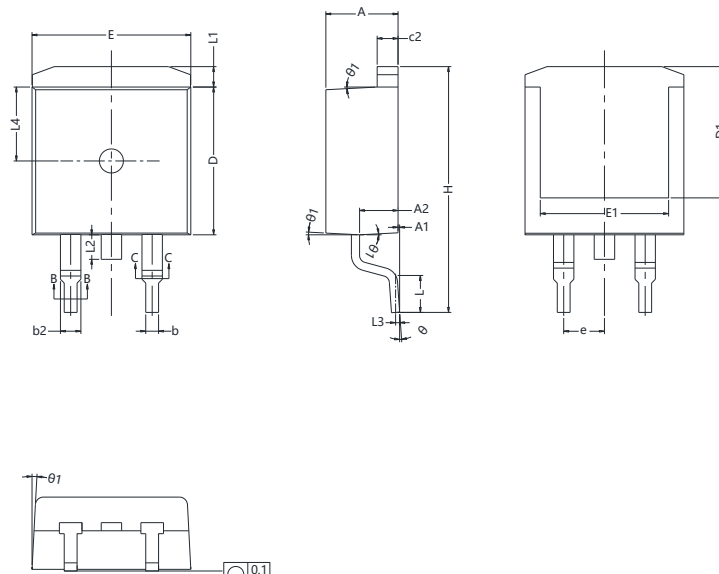


Figure 11. Diode transient thermal impedance

Package Information



(UNITS OF MEASURE=MILLIMETER)			
SYMBOL	MIN	NOM	MAX
A	4.40	4.50	4.60
A1	0.00	0.10	0.25
A2	2.20	2.40	2.60
b	0.76	—	0.89
b2	1.23	—	1.37
c	0.47	—	0.60
c1	0.46	0.51	0.56
c2	1.25	1.30	1.35
D	9.10	9.20	9.30
D1	8.00	—	—
E	9.80	9.90	10.00
E1	7.80	—	—
e	2.54BSC		
H	14.90	15.30	15.70
L	2.00	2.30	2.30
L1	1.17	1.27	1.40
L2	—	—	1.75
L3	0.25BSC		
L4	4.60 REF		
θ	0°	—	8°
θ1	1°	3°	5°

Version 1: TO263-J package outline dimension

Ordering Information

Package Type	Units/ Reel	Reels/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
TO263-J	800	1	800	10	8000

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
OSC50N65KF	TO263	yes	yes	yes

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