

General Description

OST50N65K7TMAF 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
- AEC-Q101 Qualified for Automotive Application



Applications

- Induction converters
- On-board charger
- DC/DC converter

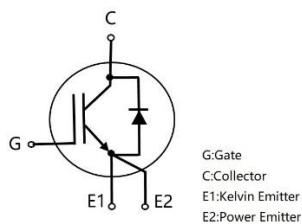
Key Performance Parameters

Parameter	Value	Unit
$V_{CES, min} @ 25\text{ }^{\circ}\text{C}$	650	V
Maximum junction temperature	175	$^{\circ}\text{C}$
$I_C, \text{ pulse}$	200	A
$V_{CE(sat), typ} @ V_{GE}=15\text{ V}$	1.23	V
Q_g	109	nC

Marking Information

Product Name	Package	Marking
OST50N65K7TMAF	TO263-7L	OST50N65K7TMA

Package & Pin Information



Absolute Maximum Ratings at $T_{vj}=25\text{ }^{\circ}\text{C}$ 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, $T_P \leq 10\text{ }\mu\text{s}$, $D < 0.01$		± 30	V
Continuous collector current ¹⁾ , $T_C = 25\text{ }^{\circ}\text{C}$	I_C	80	A
Continuous collector current ¹⁾ , $T_C = 100\text{ }^{\circ}\text{C}$		50	A
Pulsed collector current ²⁾ , $T_C = 25\text{ }^{\circ}\text{C}$	$I_{C, \text{ pulse}}$	200	A
Diode forward current ¹⁾ , $T_C = 25\text{ }^{\circ}\text{C}$	I_F	80	A
Diode forward current ¹⁾ , $T_C = 100\text{ }^{\circ}\text{C}$		50	A
Diode pulsed current ²⁾ , $T_C = 25\text{ }^{\circ}\text{C}$	$I_{F, \text{ pulse}}$	200	A
Power dissipation ³⁾ , $T_C = 25\text{ }^{\circ}\text{C}$	P_D	272	W
Power dissipation ³⁾ , $T_C = 100\text{ }^{\circ}\text{C}$		136	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	$R_{\theta JC}$	0.55	$^{\circ}\text{C/W}$
Diode thermal resistance, junction-case	$R_{\theta JC}$	0.65	$^{\circ}\text{C/W}$
Thermal resistance, junction-ambient ⁴⁾	$R_{\theta JA}$	40	$^{\circ}\text{C/W}$

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Collector-emitter breakdown voltage	$V_{(BR)CES}$	650			V	$V_{GE}=0\text{ V}$, $I_C=0.5\text{ mA}$
Collector-emitter saturation voltage	$V_{CE(sat)}$		1.23	1.6	V	$V_{GE}=15\text{ V}$, $I_C=50\text{ A}$ $T_{vj}=25\text{ }^{\circ}\text{C}$
			1.29		V	$V_{GE}=15\text{ V}$, $I_C=50\text{ A}$, $T_{vj}=125\text{ }^{\circ}\text{C}$
			1.34		V	$V_{GE}=15\text{ V}$, $I_C=50\text{ A}$, $T_{vj}=175\text{ }^{\circ}\text{C}$
Gate-emitter threshold voltage	$V_{GE(th)}$	3.5	4.0	4.5	V	$V_{CE}=V_{GE}$, $I_D=0.5\text{ mA}$
Diode forward voltage	V_F		1.11	1.4	V	$V_{GE}=0\text{ V}$, $I_F=50\text{ A}$ $T_{vj}=25\text{ }^{\circ}\text{C}$
			1.08		V	$V_{GE}=0\text{ V}$, $I_F=50\text{ A}$, $T_{vj}=125\text{ }^{\circ}\text{C}$
			1.06		V	$V_{GE}=0\text{ V}$, $I_F=50\text{ A}$, $T_{vj}=175\text{ }^{\circ}\text{C}$
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}		5464		pF	$V_{GE}=0\text{ V}$, $V_{CE}=25\text{ V}$, $f=100\text{ kHz}$
Output capacitance	C_{oes}		394		pF	
Reverse transfer capacitance	C_{res}		18		pF	
Turn-on delay time	$t_{d(on)}$		117		ns	$V_{GE}=15\text{ V}$, $V_{CC}=400\text{ V}$, $R_G^{(5)}=48\ \Omega$, $I_C=50\text{ A}$
Rise time	t_r		41		ns	
Turn-off delay time	$t_{d(off)}$		574		ns	
Fall time	t_f		93		ns	
Turn-on energy	E_{on}		3.47		mJ	
Turn-off energy	E_{off}		1.90		mJ	
Turn-on delay time	$t_{d(on)}$		110		ns	$V_{GE}=15\text{ V}$, $V_{CC}=400\text{ V}$, $R_G^{(5)}=48\ \Omega$, $I_C=25\text{ A}$
Rise time	t_r		28		ns	
Turn-off delay time	$t_{d(off)}$		634		ns	
Fall time	t_f		119		ns	
Turn-on energy	E_{on}		2.06		mJ	
Turn-off energy	E_{off}		1.03		mJ	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		109		nC	$V_{GE}=15\text{ V}$, $V_{CC}=520\text{ V}$, $I_C=50\text{ A}$
Gate-emitter charge	Q_{ge}		35		nC	
Gate-collector charge	Q_{gc}		39		nC	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode reverse recovery time	t_{rr}		322		ns	$V_R=400\text{ V}$, $I_F=50\text{ A}$, $di_F/dt=500\text{ A}/\mu\text{s}$, $T_{vj}=25\text{ }^\circ\text{C}$
Diode reverse recovery charge	Q_{rr}		13.8		μC	
Diode peak reverse recovery current	I_{rrm}		77.4		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 1inch² FR-4 board with 2oz. Copper, in a still air environment with $T_a=25\text{ }^\circ\text{C}$.
- 5) Recommended drive resistance greater than or equal to 66 Ω

Electrical Characteristics Diagrams

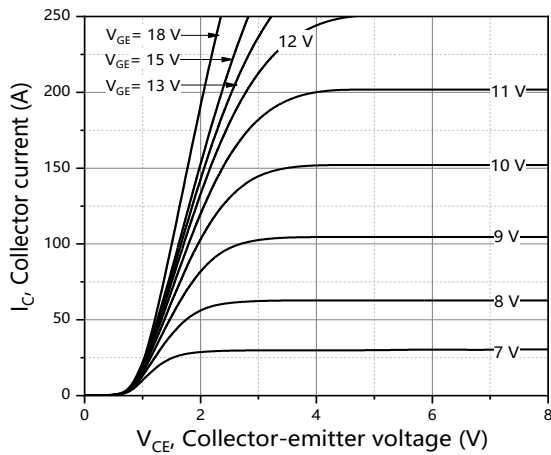


Figure 1. Typical output characteristics
($T_{vj}=25\text{ }^{\circ}\text{C}$)

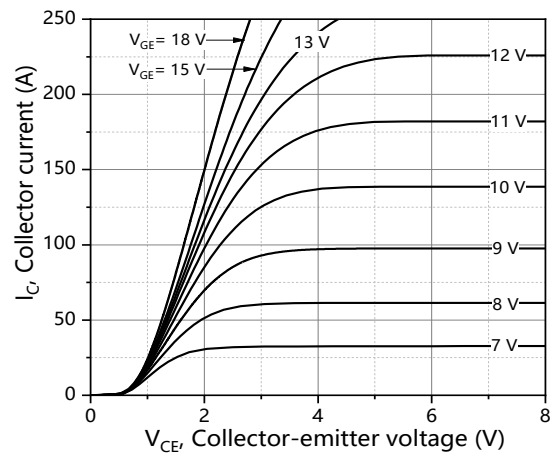


Figure 2. Typical output characteristics
($T_{vj}=150\text{ }^{\circ}\text{C}$)

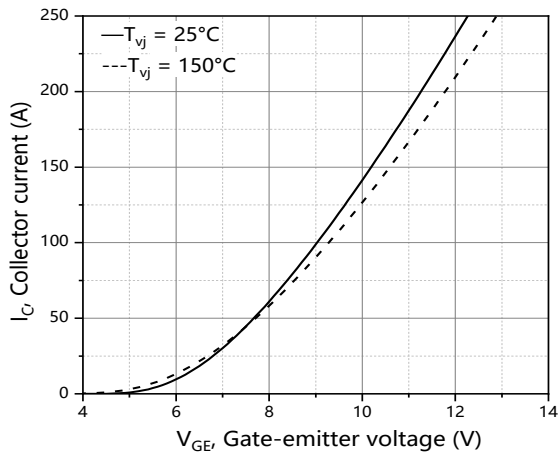


Figure 3. Typical transfer characteristics
($V_{CE}=20\text{ V}$)

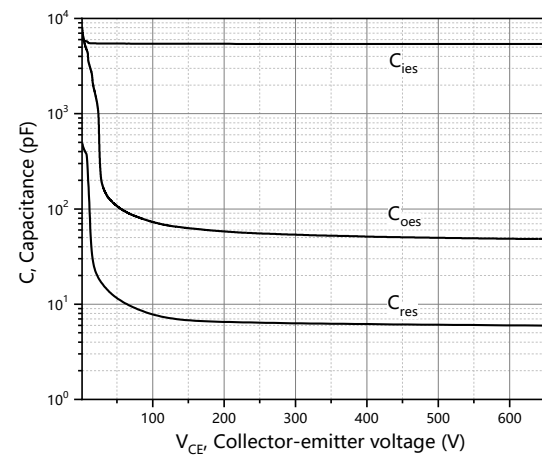


Figure 4. Typical capacitance
($V_{GE}=0\text{ V}$, $f=100\text{ kHz}$)

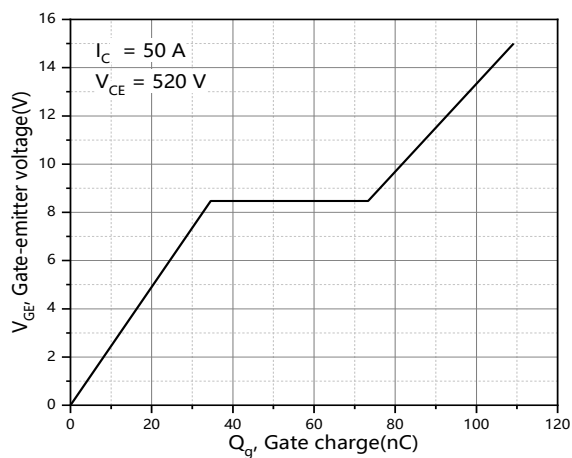


Figure 5. Typical gate charge

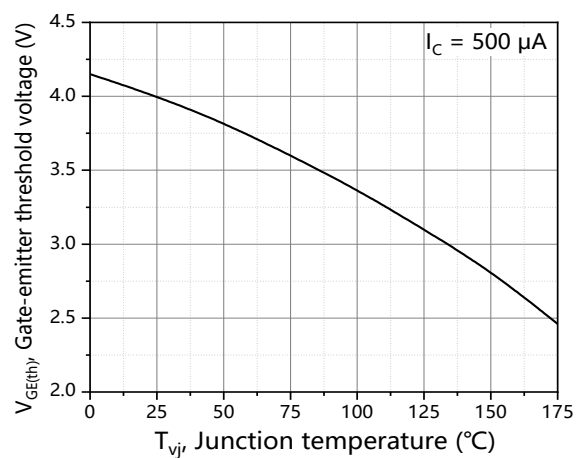


Figure 6. Gate-emitter threshold voltage

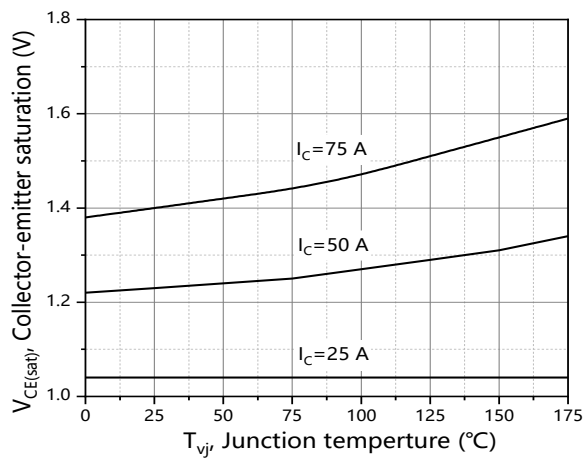


Figure 7. Typical collector-emitter voltage

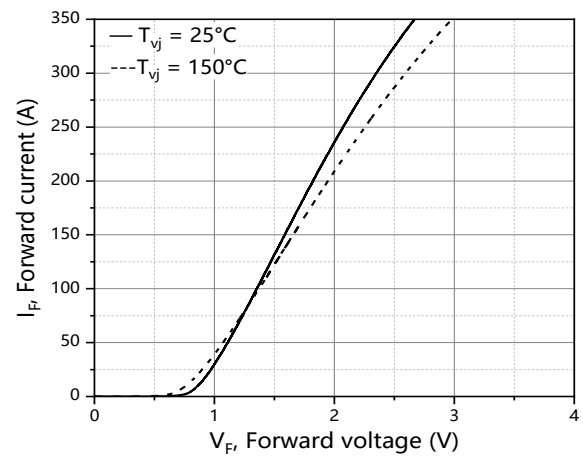


Figure 8. Forward characteristic of diode

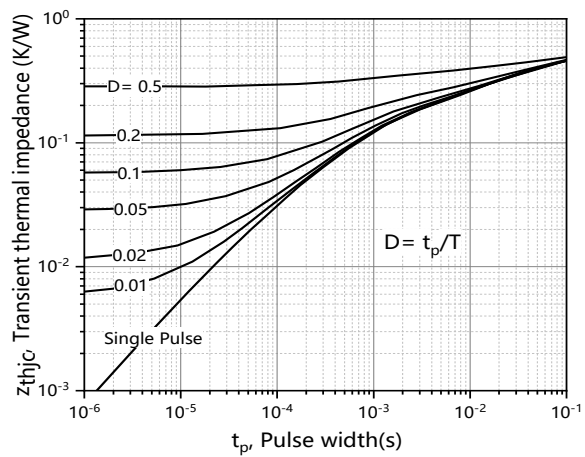


Figure 9. IGBT transient thermal impedance

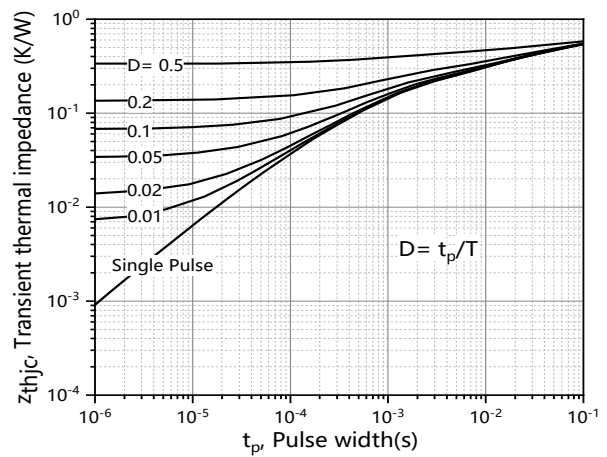


Figure 10. Diode transient thermal impedance

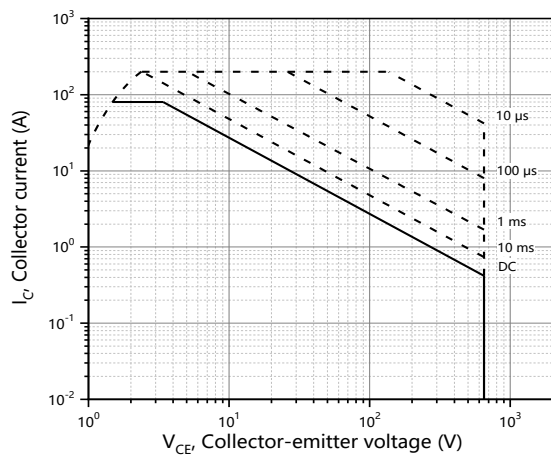
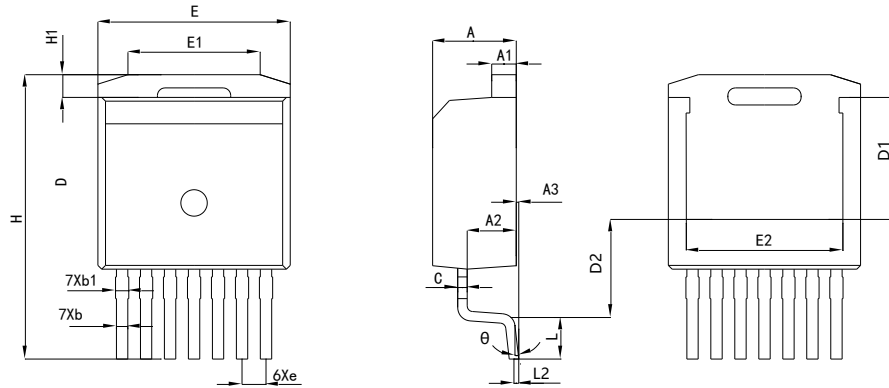


Figure 11. Safe operating area
($T_{vj}=25^{\circ}\text{C}$)

Package Information



Symbol	mm		
	Min	Nom	Max
A	4.30	4.43	4.56
A1	1.20	1.30	1.40
A2	2.45	2.60	2.75
A3	0.00	0.13	0.25
b	0.50	0.60	0.70
b1	0.60	0.70	0.90
c	0.45	0.50	0.60
D	8.93	9.08	9.23
D1	6.30	6.45	6.60
D2	5.18 REF		
e	1.27 BSC		
E	10.08	10.18	10.28
E1	7.00 REF		
E2	7.90	8.30	8.70
H	14.53	15.03	15.53
H1	0.98	1.20	1.42
L	1.90	2.20	2.50
L2	0.25 BSC		
θ	0°	3°	7°

Version 1: TO263-7L-P package outline dimension

Ordering Information

Package Type	Units/ Reel	Reel / Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
TO263-7L-P	800	1	800	5	4000

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
OST50N65K7TMAF	TO263-7L	yes	yes	yes

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