



General Description

OST50N65H4EN2F_NB 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
- Fast and soft antiparallel diode



Applications

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

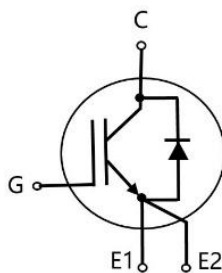
Key Performance Parameters

Parameter	Value	Unit
$V_{CES, min} @ 25^{\circ}C$	650	V
Maximum junction temperature	175	$^{\circ}C$
$I_C, pulse$	200	A
$V_{CE(sat), typ} @ V_{GE}=15V$	1.5	V
Q_g	132	nC

Marking Information

Product Name	Package	Marking
OST50N65H4EN2F_NB	TO247-4L-NL	OST50N65H4EN2

Package & Pin Information



G:Gate
 C:Collector
 E1:Kelvin Emitter
 E2:Power Emitter


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	231	W
Power dissipation ³⁾ , $T_C = 100^{\circ}\text{C}$		116	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	$R_{\theta JC}$	0.65	$^{\circ}\text{C/W}$
Diode thermal resistance, junction-case	$R_{\theta JC}$	0.92	$^{\circ}\text{C/W}$
Thermal resistance, junction-ambient	$R_{\theta JA}$	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	$V_{GE}=0\text{ V}$, $I_C=0.5\text{ mA}$
Collector-emitter saturation voltage	$V_{CE(sat)}$		1.5	2.0	V	$V_{GE}=15\text{ V}$, $I_C=50\text{ A}$, $T_{vj}=25^{\circ}\text{C}$
			1.85		V	$V_{GE}=15\text{ V}$, $I_C=50\text{ A}$, $T_{vj}=125^{\circ}\text{C}$
			2.09		V	$V_{GE}=15\text{ V}$, $I_C=50\text{ A}$, $T_{vj}=175^{\circ}\text{C}$
Gate-emitter threshold voltage	$V_{GE(th)}$	3.5	4.0	4.5	V	$V_{CE}=V_{GE}$, $I_C=0.5\text{ mA}$
Diode forward voltage	V_F		1.3		V	$V_{GE}=0\text{ V}$, $I_F=50\text{ A}$, $T_{vj}=25^{\circ}\text{C}$
			1.19		V	$V_{GE}=0\text{ V}$, $I_F=50\text{ A}$, $T_{vj}=125^{\circ}\text{C}$
			1.16		V	$V_{GE}=0\text{ V}$, $I_F=50\text{ A}$, $T_{vj}=175^{\circ}\text{C}$
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}		5568		pF	$V_{GE}=0\text{ V}$, $V_{CE}=25\text{ V}$, $f=100\text{ kHz}$
Output capacitance	C_{oes}		113		pF	
Reverse transfer capacitance	C_{res}		16		pF	
Turn-on delay time	$t_{d(on)}$		30		ns	$V_{GE}=15\text{ V}$, $V_{CC}=400\text{ V}$, $R_G=10\ \Omega$, $I_C=50\text{ A}$, $T_{vj} = 25^\circ\text{C}$
Rise time	t_r		13		ns	
Turn-off delay time	$t_{d(off)}$		132		ns	
Fall time	t_f		11		ns	
Turn-on energy	E_{on}		1.01		mJ	
Turn-off energy	E_{off}		0.35		mJ	
Turn-on delay time	$t_{d(on)}$		28		ns	$V_{GE}=15\text{ V}$, $V_{CC}=400\text{ V}$, $R_G=10\ \Omega$, $I_C=25\text{ A}$, $T_{vj} = 25^\circ\text{C}$
Rise time	t_r		8		ns	
Turn-off delay time	$t_{d(off)}$		147		ns	
Fall time	t_f		9		ns	
Turn-on energy	E_{on}		0.61		mJ	
Turn-off energy	E_{off}		0.16		mJ	
Turn-on delay time	$t_{d(on)}$		29		ns	$V_{GE}=15\text{ V}$, $V_{CC}=400\text{ V}$, $R_G=10\ \Omega$, $I_C=50\text{ A}$, $T_{vj} = 175^\circ\text{C}$
Rise time	t_r		17		ns	
Turn-off delay time	$t_{d(off)}$		148		ns	
Fall time	t_f		16		ns	
Turn-on energy	E_{on}		1.85		mJ	
Turn-off energy	E_{off}		0.49		mJ	
Turn-on delay time	$t_{d(on)}$		27		ns	$V_{GE}=15\text{ V}$, $V_{CC}=400\text{ V}$, $R_G=10\ \Omega$, $I_C=25\text{ A}$, $T_{vj} = 175^\circ\text{C}$
Rise time	t_r		10		ns	
Turn-off delay time	$t_{d(off)}$		171		ns	
Fall time	t_f		13		ns	
Turn-on energy	E_{on}		1.14		mJ	
Turn-off energy	E_{off}		0.24		mJ	



Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		132		nC	$V_{GE}=15\text{ V}$, $V_{CC}=520\text{ V}$, $I_C=50\text{ A}$
Gate-emitter charge	Q_{ge}		41		nC	
Gate-collector charge	Q_{gc}		27		nC	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode reverse recovery time	t_{rr}		178		ns	$V_R=400\text{ V}$, $I_F=50\text{ A}$, $di_F/dt=1000\text{ A}/\mu\text{s}$, $T_{vj} = 25^\circ\text{C}$
Diode reverse recovery charge	Q_{rr}		3.64		μC	
Diode peak reverse recovery current	I_{rrm}		41		A	
Diode reverse recovery time	t_{rr}		262		ns	$V_R=400\text{ V}$, $I_F=50\text{ A}$, $di_F/dt=1000\text{ A}/\mu\text{s}$, $T_{vj} = 175^\circ\text{C}$
Diode reverse recovery charge	Q_{rr}		7.75		μC	
Diode peak reverse recovery current	I_{rrm}		63		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.

Electrical Characteristics Diagrams

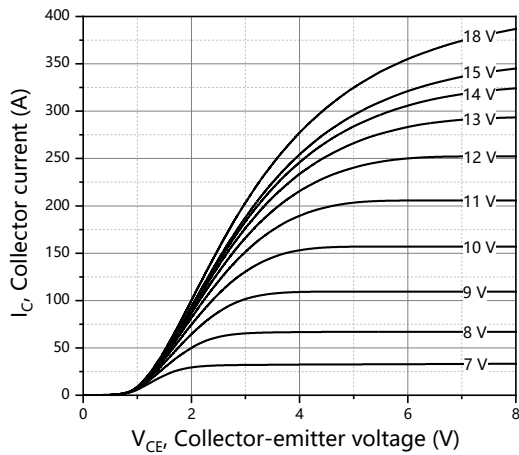


Figure 1. Typical output characteristics
($T_{vj}=25^{\circ}\text{C}$)

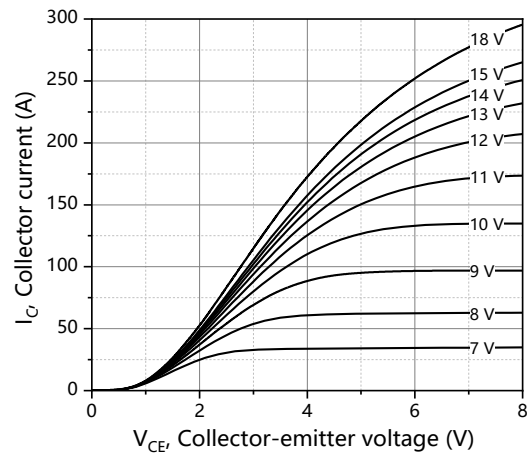


Figure 2. Typical output characteristics
($T_{vj}=150^{\circ}\text{C}$)

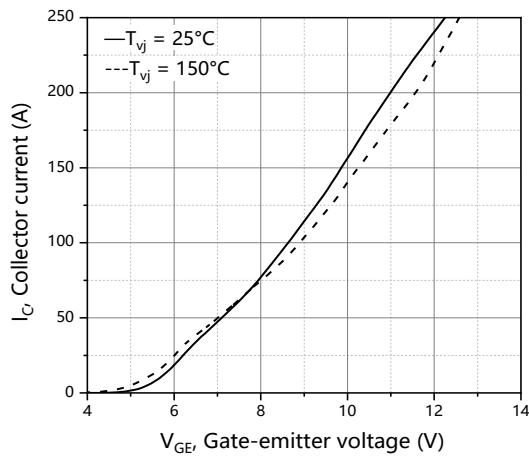


Figure 3. Typical transfer characteristics
($V_{CE}=20\text{V}$)

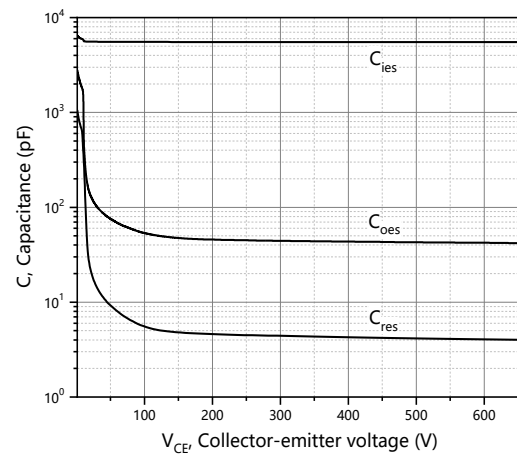


Figure 4. Typical capacitance
($V_{GE}=0\text{V}$, $f=100\text{ kHz}$)

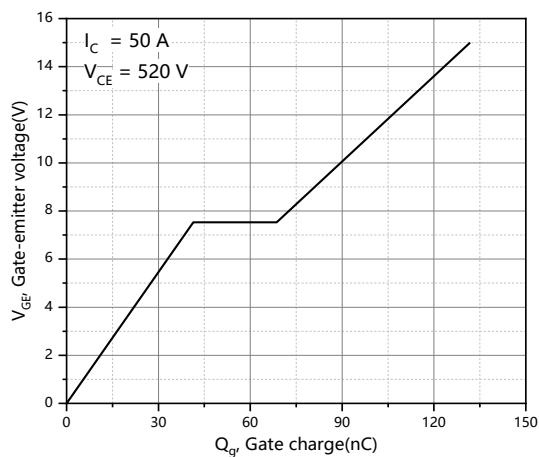


Figure 5. Typical gate charge

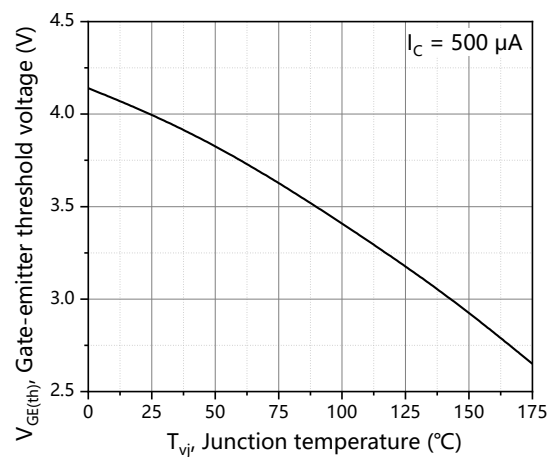


Figure 6. Gate-emitter threshold voltage

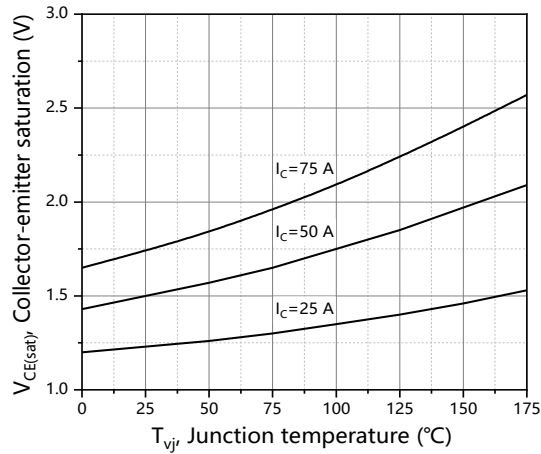


Figure 7. Typical collector-emitter voltage

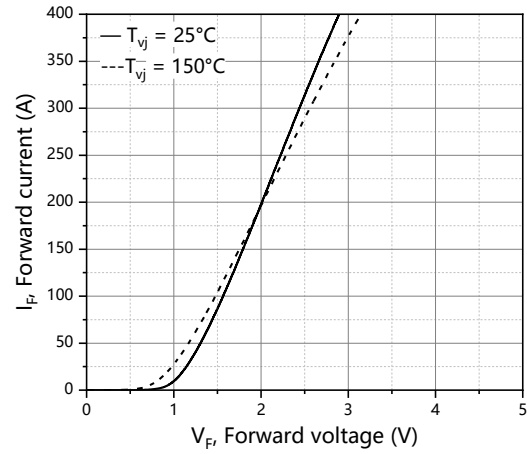


Figure 8. Forward characteristic of diode

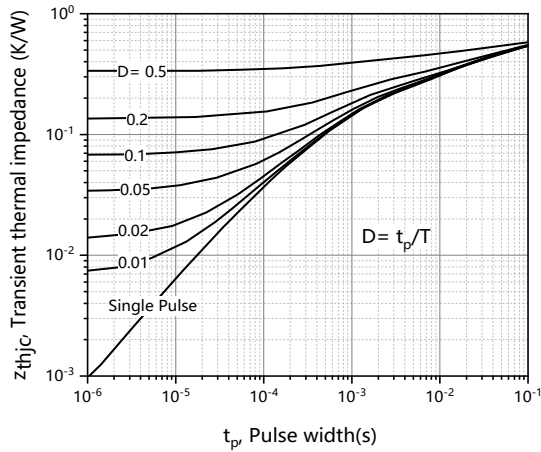


Figure 9. IGBT transient thermal impedance

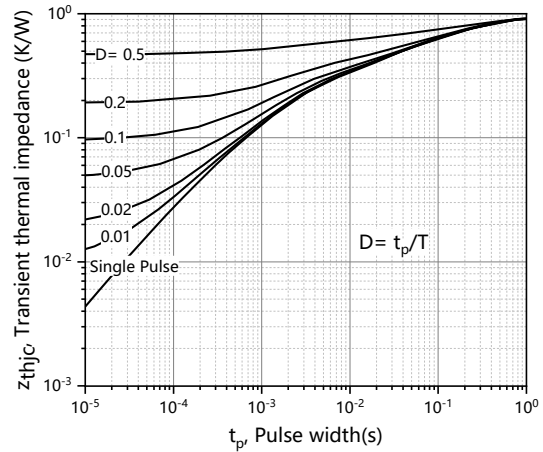


Figure 10. Diode transient thermal impedance

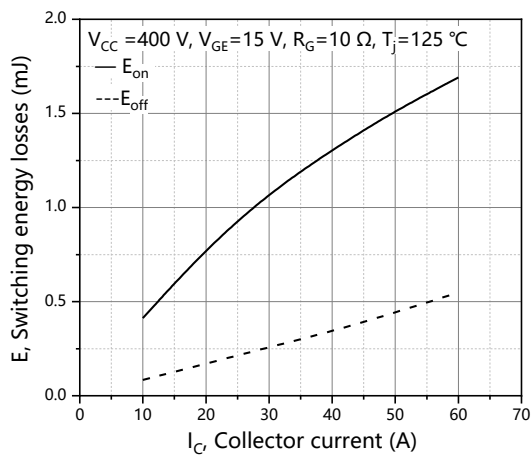
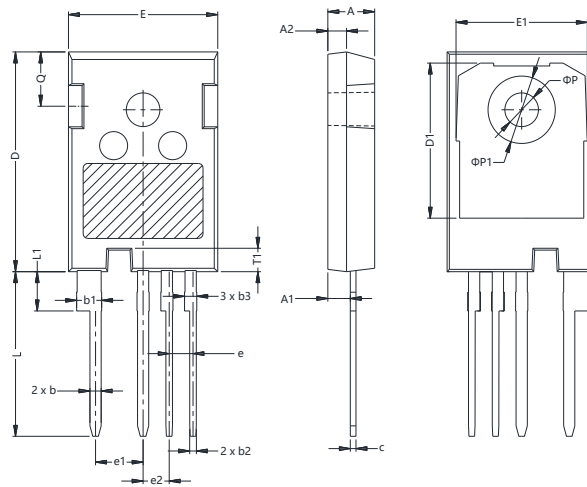


Figure 11. Switching energy vs. collector current

Package Information



Symbol	mm		
	Min	Nom	Max
A	4.80	5.00	5.20
A1	2.21	2.41	2.61
A2	1.80	2.00	2.20
b	1.06	1.21	1.36
b1	2.33	2.63	2.93
b2	0.60	0.70	0.80
b3	1.07	1.30	1.60
c	0.51	0.61	0.75
D	23.30	23.45	23.60
D1	16.25	16.55	16.85
E	15.74	15.94	16.14
E1	13.72	14.02	14.32
T1	2.35	2.50	2.65
e	2.54BSC		
e1	5.08BSC		
e2	2.79BSC		
Q	5.49	5.79	6.09
L	17.27	17.57	17.87
L1	3.99	4.19	4.39
ΦP	3.40	3.60	3.80
ΦP1	7.19REP		

Version : TO247-4L-NL-P package outline dimension

Ordering Information

Package Type	Units/ Tube	Tubes/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
TO247-4L-NL-P	30	11	330	6	1980

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
OST50N65H4EN2F_NB	TO247-4L-NL	yes	yes	yes

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Revision History

Version	Revision History	Data
V1.0	Initial release	2025-07-15