



General Description

OST160N65H5SNAF 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

- PV inverters
- EV main inverter
- Uninterruptible power supplies
- Motor driver

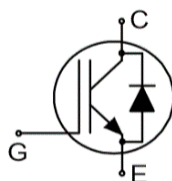
Key Performance Parameters

Parameter	Value	Unit
$V_{CES, min} @ 25^{\circ}C$	650	V
Maximum junction temperature	175	$^{\circ}C$
$I_C, pulse$	640	A
$V_{CE(sat), typ} @ V_{GE}=15V$	1.45	V
Q_g	471	nC

Marking Information

Product Name	Package	Marking
OST160N65H5SNAF	TO247- plus	OST160N65H5SN

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	160	A
Continuous collector current ¹⁾ , $T_C=100^{\circ}\text{C}$		160	A
Pulsed collector current ²⁾ , $T_C=25^{\circ}\text{C}$	$I_{C, \text{pulse}}$	640	A
Diode forward current ¹⁾ , $T_C=25^{\circ}\text{C}$	I_F	160	A
Diode forward current ¹⁾ , $T_C=100^{\circ}\text{C}$		160	A
Diode pulsed current ²⁾ , $T_C=25^{\circ}\text{C}$	$I_{F, \text{pulse}}$	640	A
Power dissipation ³⁾ , $T_C=25^{\circ}\text{C}$	P_D	536	W
Power dissipation ³⁾ , $T_C=100^{\circ}\text{C}$		268	W
Operation and storage temperature	T_{stg}, T_{vj}	-55 to 175	$^{\circ}\text{C}$
Short circuit withstand time $V_{GE}=15\text{ V}$, $V_{CC} \leq 400\text{ V}$ Allowed number of short circuits < 1000 Time between short circuits: $\geq 1.0\text{ S}$	t_{sc}	5	μs

Thermal Characteristics

Parameter	Symbol	Value	Unit
IGBT thermal resistance, junction-case	$R_{\theta JC}$	0.28	$^{\circ}\text{C/W}$
Diode thermal resistance, junction-case	$R_{\theta JC}$	0.45	$^{\circ}\text{C/W}$
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	$V_{CE(sat)}$		1.45	1.75	V	$V_{GE}=15\text{ V}$, $I_C=160\text{ A}$, $T_{vj}=25^{\circ}\text{C}$
			1.61		V	$V_{GE}=15\text{ V}$, $I_C=160\text{ A}$, $T_{vj}=125^{\circ}\text{C}$
			1.72			$V_{GE}=15\text{ V}$, $I_C=160\text{ A}$, $T_{vj}=175^{\circ}\text{C}$
Gate-emitter threshold voltage	$V_{GE(th)}$	4.4	5.4	6.4	V	$V_{CE}=V_{GE}$, $I_D=0.5\text{ mA}$
Diode forward voltage	V_F		1.80	2.2	V	$V_{GE}=0\text{ V}$, $I_F=160\text{ A}$, $T_{vj}=25^{\circ}\text{C}$
			1.71			$V_{GE}=0\text{ V}$, $I_F=160\text{ A}$, $T_{vj}=125^{\circ}\text{C}$
			1.65			$V_{GE}=0\text{ V}$, $I_F=160\text{ A}$, $T_{vj}=175^{\circ}\text{C}$
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}		11374		pF	$V_{GE}=0\text{ V}$, $V_{CE}=25\text{ V}$, $f=100\text{ kHz}$
Output capacitance	C_{oes}		426		pF	
Reverse transfer capacitance	C_{res}		203		pF	
Turn-on delay time	$t_{d(on)}$		141		ns	$V_{GE}=15\text{ V}$, $V_{CC}=400\text{ V}$, $R_G=10\ \Omega$, $I_C=160\text{ A}$
Rise time	t_r		270		ns	
Turn-off delay time	$t_{d(off)}$		572		ns	
Fall time	t_f		163		ns	
Turn-on energy	E_{on}		13.4		mJ	
Turn-off energy	E_{off}		4.9		mJ	
Turn-on delay time	$t_{d(on)}$		124		ns	$V_{GE}=15\text{ V}$, $V_{CC}=400\text{ V}$, $R_G=10\ \Omega$, $I_C=80\text{ A}$
Rise time	t_r		136		ns	
Turn-off delay time	$t_{d(off)}$		620		ns	
Fall time	t_f		84		ns	
Turn-on energy	E_{on}		4.3		mJ	
Turn-off energy	E_{off}		1.8		mJ	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		471		nC	$V_{GE}=15\text{ V}$, $V_{CC}=520\text{ V}$, $I_C=160\text{ A}$
Gate-emitter charge	Q_{ge}		160		nC	
Gate-collector charge	Q_{gc}		204		nC	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode reverse recovery time	t_{rr}		105		ns	$V_R=400\text{ V}$, $I_F=160\text{ A}$, $di_F/dt=500\text{ A}/\mu\text{s}$ $T_{vj}=25^\circ\text{C}$
Diode reverse recovery charge	Q_{rr}		1.2		μC	
Diode peak reverse recovery current	I_{rrm}		21		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

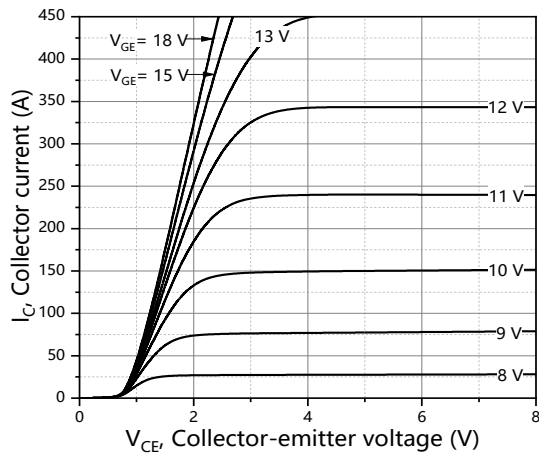


Figure 1. Typical output characteristics
($T_{vj}=25^{\circ}\text{C}$)

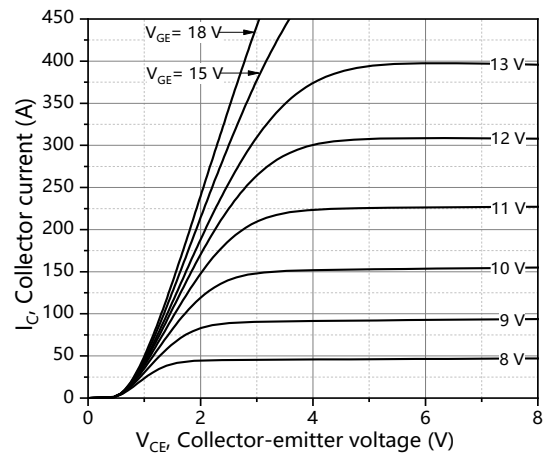


Figure 2. Typical output characteristics
($T_{vj}=150^{\circ}\text{C}$)

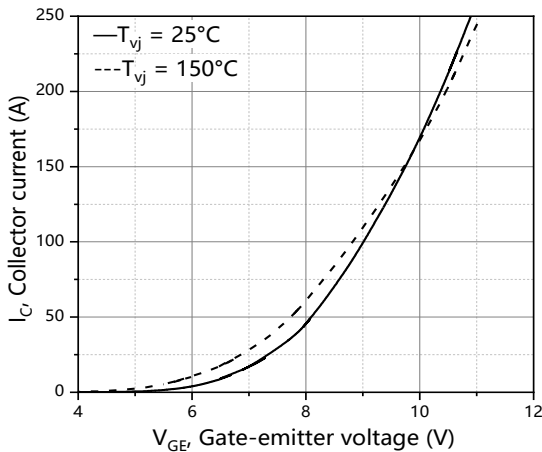


Figure 3. Typical transfer characteristics
($V_{CE}=20\text{V}$)

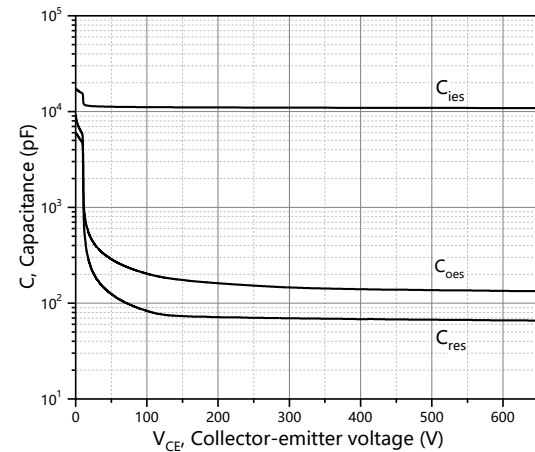


Figure 4. Typical capacitance
($V_{GE}=0\text{V}$, $f=100\text{ kHz}$)

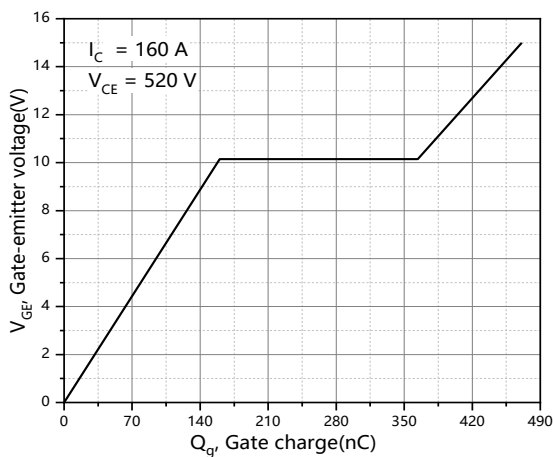


Figure 5. Typical gate charge

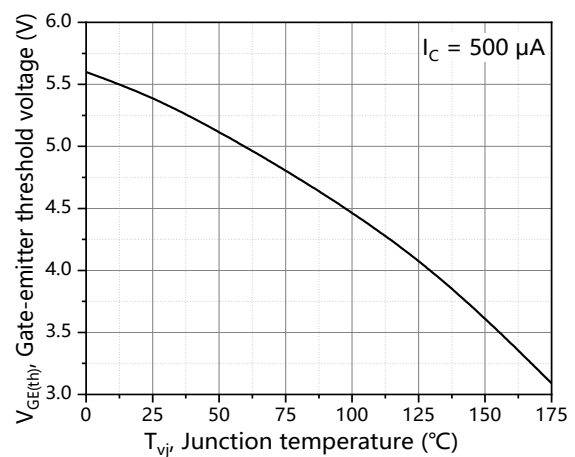


Figure 6. Gate-emitter threshold voltage

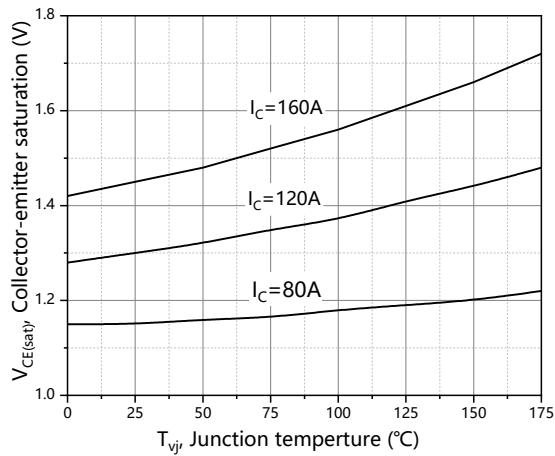


Figure 7. Typical collector-emitter voltage

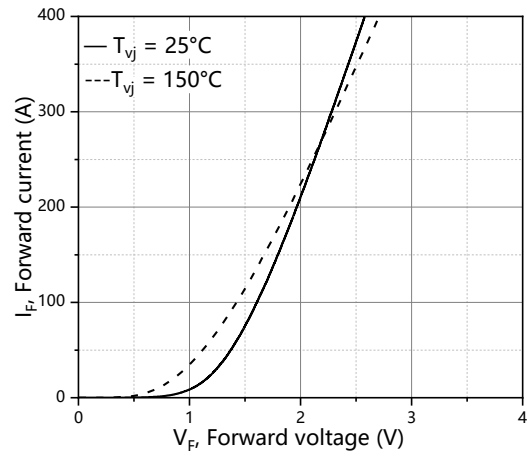


Figure 8. Forward characteristic of diode

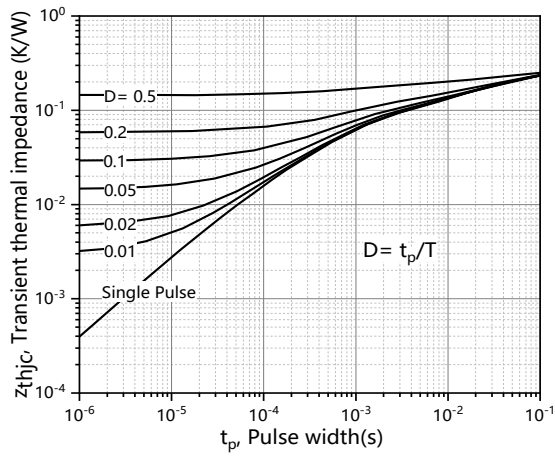


Figure 9. IGBT transient thermal impedance

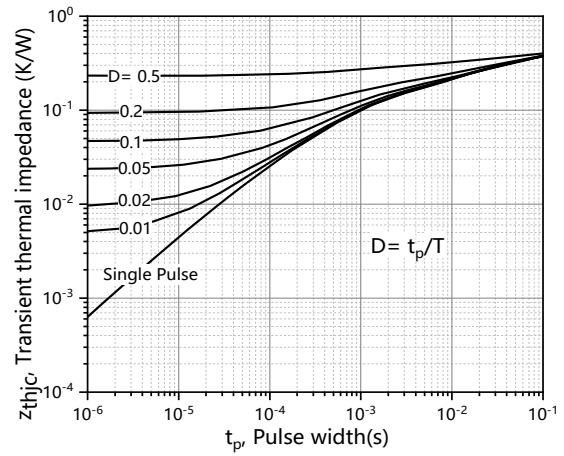
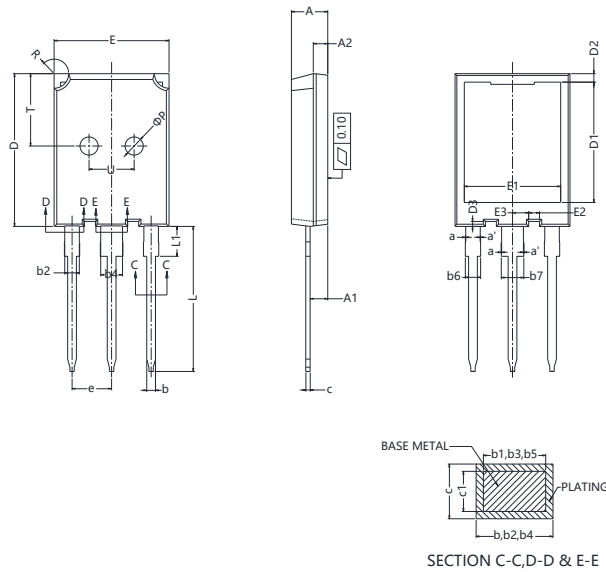


Figure 10. Diode transient thermal impedance

Package Information



Symbol	mm		
	Min	Nom	Max
A	4.90	5.00	5.10
A1	2.31	2.41	2.51
A2	1.90	2.00	2.10
a	0.00		0.15
a'	0.00		0.15
b	1.16		1.26
b1	1.15	1.20	1.22
b2	1.96		2.06
b3	1.95	2.00	2.02
b4	2.96		3.06
b5	2.96	3.00	3.02
b6			2.25
b7			3.25
c	0.59		0.66
c1	0.59	0.60	0.66
D	20.90	21.00	21.10
D1	16.25	16.55	16.85
D2	1.05	1.17	1.35
D3	0.58		0.78
E	15.70	15.80	15.90
E1	13.10	13.30	13.50
E2	1.40	1.50	1.60
E3	2.12	2.22	2.32
e	5.436 BSC		
L	19.80	19.95	20.10
L1			4.30
P	2.40	2.50	2.60
R	1.90		2.10
T	9.80		10.20
U	6.00		6.40

Version 1: TO247-plus-J package outline dimension

Ordering Information

Package Type	Units/ Tube	Tubes/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
TO247-plus-J	30	20	600	4	2400

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
OST160N65H5SNAF	TO247-plus	yes	yes	yes

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