



General Description

OST40N120HWF 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 SiC diode



Applications

- PV inverters
- Induction converters
- Uninterruptible power supplies

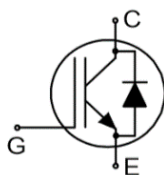
Key Performance Parameters

Parameter	Value	Unit
$V_{CES, min} @ 25^{\circ}C$	1200	V
Maximum junction temperature	175	$^{\circ}C$
$I_C, pulse$	160	A
$V_{CE(sat), typ} @ V_{GE}=15V$	1.5	V
Q_g	207	nC

Marking Information

Product Name	Package	Marking
OST40N120HWF	TO247	OST40N120HW

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}	1200	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	56	A
Continuous collector current ¹⁾ , $T_C = 100^{\circ}\text{C}$		40	A
Pulsed collector current ²⁾ , $T_C = 25^{\circ}\text{C}$	$I_{C, \text{pulse}}$	160	A
Diode forward current ¹⁾ , $T_C = 25^{\circ}\text{C}$	I_F	56	A
Diode forward current ¹⁾ , $T_C = 100^{\circ}\text{C}$		40	A
Diode pulsed current ²⁾ , $T_C = 25^{\circ}\text{C}$	$I_{F, \text{pulse}}$	160	A
Power dissipation ³⁾ , $T_C = 25^{\circ}\text{C}$	P_D	357	W
Power dissipation ³⁾ , $T_C = 100^{\circ}\text{C}$		179	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	$R_{\theta JC}$	0.42	$^{\circ}\text{C/W}$
Diode thermal resistance, junction-case	$R_{\theta JC}$	0.7	$^{\circ}\text{C/W}$
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	$V_{(BR)CES}$	1200			V	$V_{GE}=0\text{ V}$, $I_C=0.5\text{ mA}$
Collector-emitter saturation voltage	$V_{CE(sat)}$		1.5	1.9	V	$V_{GE}=15\text{ V}$, $I_C=40\text{ A}$, $T_{vj}=25^{\circ}\text{C}$
			1.68		V	$V_{GE}=15\text{ V}$, $I_C=40\text{ A}$, $T_{vj}=125^{\circ}\text{C}$
			1.8			$V_{GE}=15\text{ V}$, $I_C=40\text{ A}$, $T_{vj}=175^{\circ}\text{C}$
Gate-emitter threshold voltage	$V_{GE(th)}$	5.0	5.5	6.5	V	$V_{CE}=V_{GE}$, $I_D=0.5\text{ mA}$
Diode forward voltage	V_F		2	2.3	V	$V_{GE}=0\text{ V}$, $I_F=40\text{ A}$, $T_{vj}=25^{\circ}\text{C}$
			2.9			$V_{GE}=0\text{ V}$, $I_F=40\text{ A}$, $T_{vj}=125^{\circ}\text{C}$
			3.7			$V_{GE}=0\text{ V}$, $I_F=40\text{ A}$, $T_{vj}=175^{\circ}\text{C}$
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}			50	μA	$V_{CE}=1200\text{ V}$, $V_{GE}=0\text{ V}$

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{ies}		11228		pF	$V_{GE}=0\text{ V}$, $V_{CE}=25\text{ V}$, $f=100\text{ kHz}$
Output capacitance	C_{oes}		418		pF	
Reverse transfer capacitance	C_{res}		5.8		pF	
Turn-on delay time	$t_{d(on)}$		102		ns	$V_{GE}=15\text{ V}$, $V_{CC}=600\text{ V}$, $R_G=10\ \Omega$, $I_C=40\text{ A}$
Rise time	t_r		69		ns	
Turn-off delay time	$t_{d(off)}$		272		ns	
Fall time	t_f		158		ns	
Turn-on energy	E_{on}		1.25		mJ	
Turn-off energy	E_{off}		1.10		mJ	
Turn-on delay time	$t_{d(on)}$		96		ns	$V_{GE}=15\text{ V}$, $V_{CC}=600\text{ V}$, $R_G=10\ \Omega$, $I_C=20\text{ A}$
Rise time	t_r		41		ns	
Turn-off delay time	$t_{d(off)}$		298		ns	
Fall time	t_f		123		ns	
Turn-on energy	E_{on}		0.52		mJ	
Turn-off energy	E_{off}		0.54		mJ	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		207		nC	$V_{GE}=15\text{ V}$, $V_{CC}=960\text{ V}$, $I_C=40\text{ A}$
Gate-emitter charge	Q_{ge}		89		nC	
Gate-collector charge	Q_{gc}		36		nC	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode reverse recovery time	t_{rr}		34		ns	$V_R=600\text{ V}$, $I_F=40\text{ A}$, $di_F/dt=500\text{ A}/\mu\text{s}$ $T_{vj}=25^\circ\text{C}$
Diode reverse recovery charge	Q_{rr}		170		nC	
Diode peak reverse recovery current	I_{rrm}		8.7		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

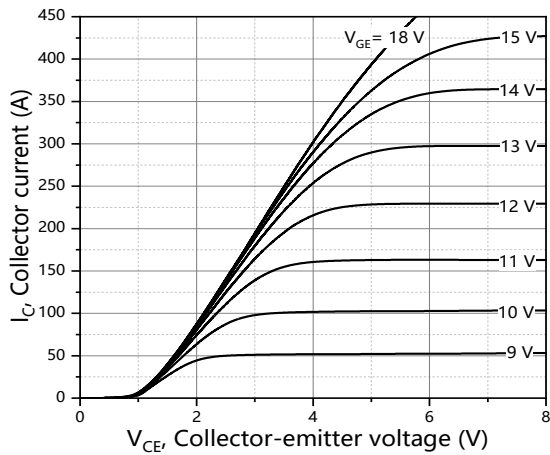


Figure 1. Typical output characteristics
($T_{vj}=25^{\circ}\text{C}$)

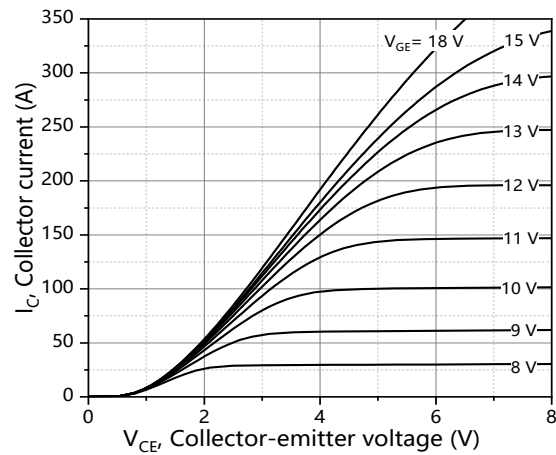


Figure 2. Typical output characteristics
($T_{vj}=150^{\circ}\text{C}$)

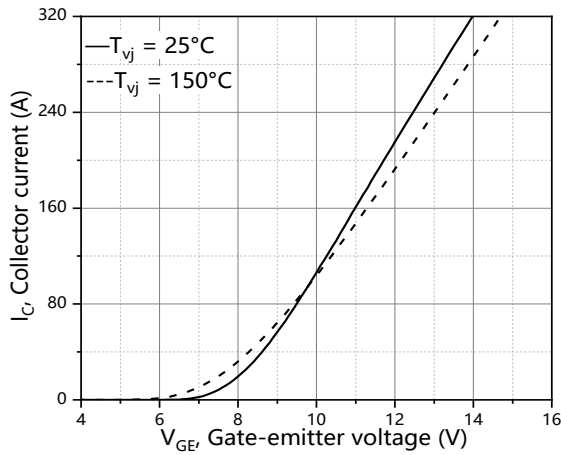


Figure 3. Typical transfer characteristics
($V_{CE}=20\text{V}$)

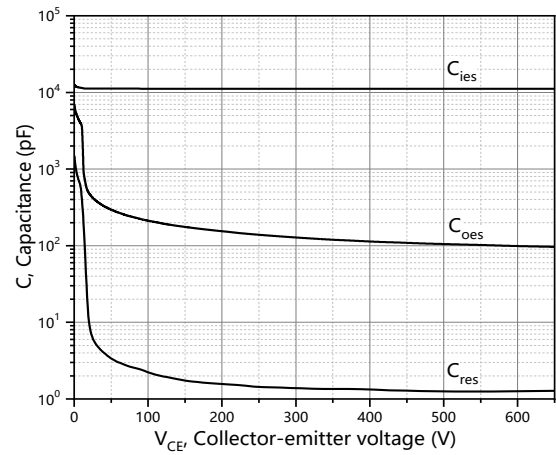


Figure 4. Typical capacitance
($V_{GE}=0\text{V}$, $f=100\text{ kHz}$)

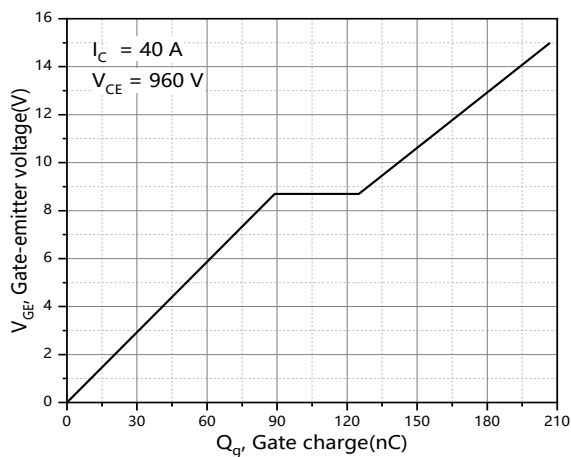


Figure 5. Typical gate charge

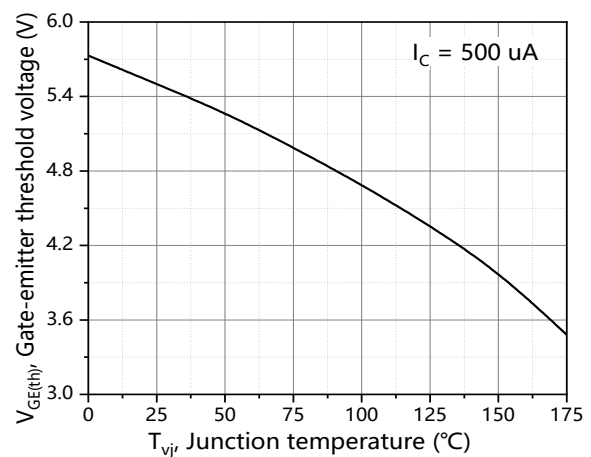


Figure 6. Gate-emitter threshold voltage

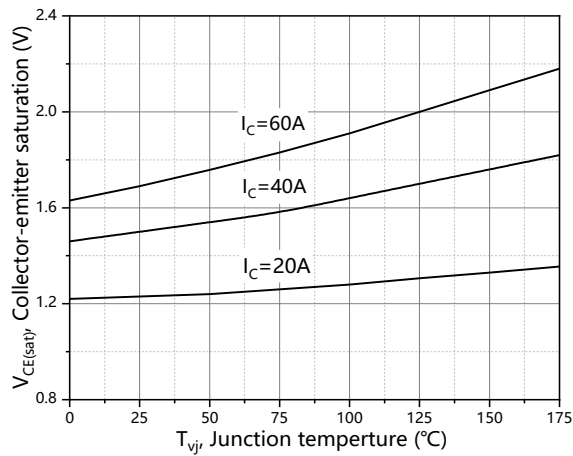


Figure 7. Typical collector-emitter voltage

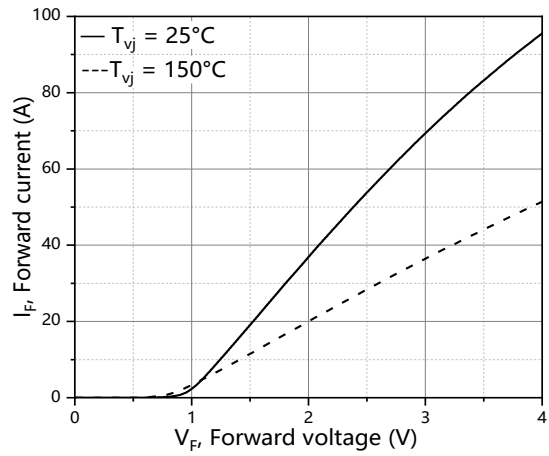


Figure 8. Forward characteristic of diode

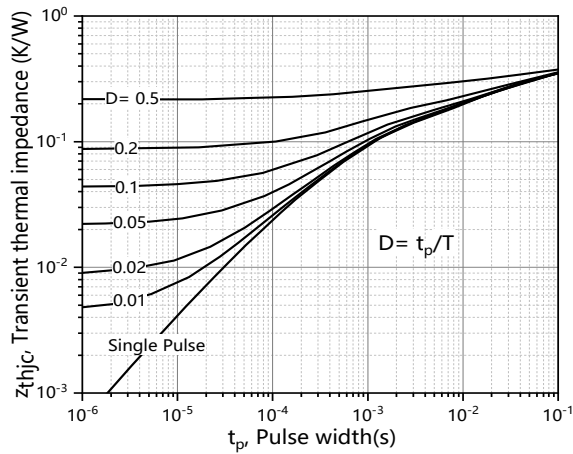


Figure 9. IGBT transient thermal impedance

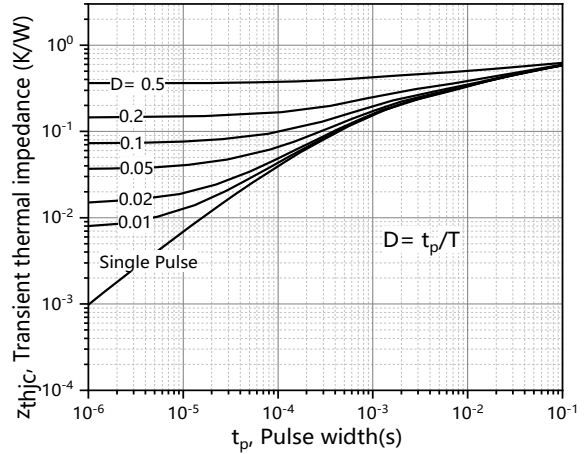
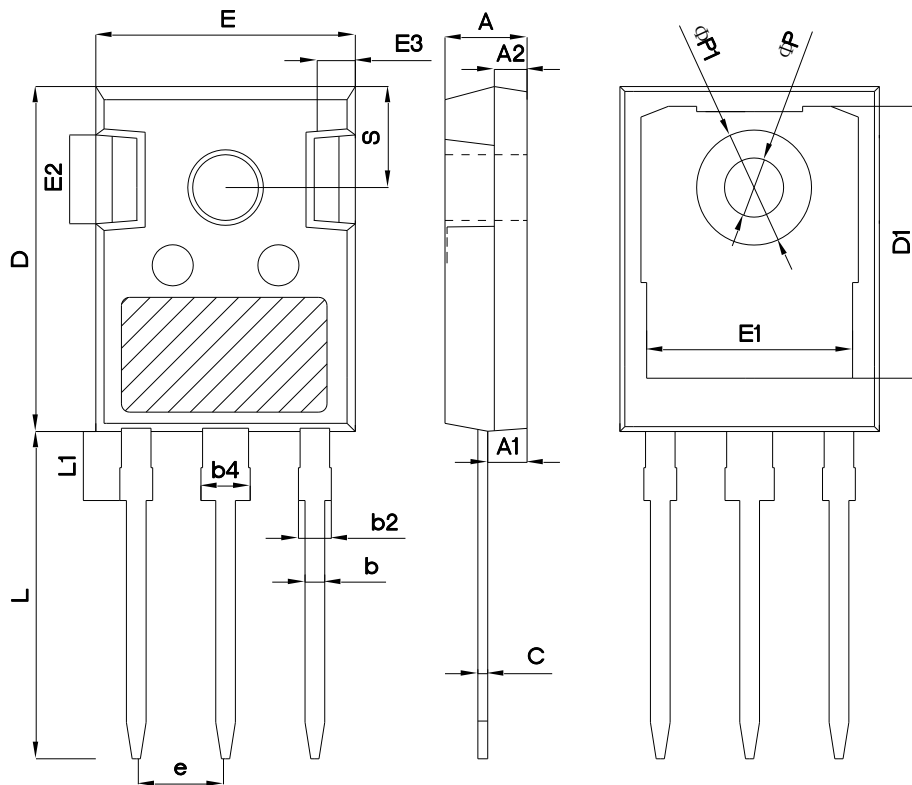


Figure 10. Diode transient thermal impedance

Package Information



Symbol	mm		
	Min	Nom	Max
A	4.80	5.00	5.20
A1	2.21	2.41	2.59
A2	1.85	2.00	2.15
b	1.11	1.21	1.36
b2	1.91	2.01	2.21
b4	2.91	3.01	3.21
c	0.51	0.61	0.75
D	20.80	21.00	21.30
D1	16.25	16.55	16.85
E	15.50	15.80	16.10
E1	13.00	13.30	13.60
E2	4.80	5.00	5.20
E3	2.30	2.50	2.70
e	5.44 BSC		
L	19.82	19.92	20.22
L1	-	-	4.30
ΦP	3.40	3.60	3.80
ΦP1	-	-	7.30
S	6.15 BSC		

Version 1: TO247-P package outline dimension



Ordering Information

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

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
OST40N6120HWF	TO247	yes	yes	yes

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