



General Description

OST120N120H7EM2F 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
- Uninterruptible power supplies

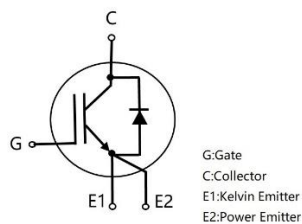
Key Performance Parameters

Parameter	Value	Unit
$V_{CES, min} @ 25\text{ }^{\circ}\text{C}$	1200	V
Maximum junction temperature	175	$^{\circ}\text{C}$
$I_C, pulse$	480	A
$V_{CE(sat), typ} @ V_{GE}=15\text{ V}$	1.65	V
Q_g	310	nC

Marking Information

Product Name	Package	Marking
OST120N120H7EM2F	TO247-plus-4L	OST120N120H7EM2

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}	1200	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	220	A
Continuous collector current ¹⁾ , $T_C = 100\text{ }^{\circ}\text{C}$		170	A
Pulsed collector current ²⁾ , $T_C = 25\text{ }^{\circ}\text{C}$	$I_{C, \text{ pulse}}$	480	A
Diode forward current ¹⁾ , $T_C = 25\text{ }^{\circ}\text{C}$	I_F	160	A
Diode forward current ¹⁾ , $T_C = 100\text{ }^{\circ}\text{C}$		120	A
Diode pulsed current ²⁾ , $T_C = 25\text{ }^{\circ}\text{C}$	$I_{F, \text{ pulse}}$	480	A
Power dissipation ³⁾ , $T_C = 25\text{ }^{\circ}\text{C}$	P_D	625	W
Power dissipation ³⁾ , $T_C = 100\text{ }^{\circ}\text{C}$		312	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	$R_{\theta JC}$	0.24	$^{\circ}\text{C/W}$
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 $T_{vj}=25\text{ }^{\circ}\text{C}$ 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	$V_{CE(sat)}$		1.65	1.9	V	$V_{GE}=15\text{ V}$, $I_C=120\text{ A}$, $T_{vj}=25\text{ }^{\circ}\text{C}$
			1.98		V	$V_{GE}=15\text{ V}$, $I_C=120\text{ A}$, $T_{vj}=125\text{ }^{\circ}\text{C}$
			2.19		V	$V_{GE}=15\text{ V}$, $I_C=120\text{ A}$, $T_{vj}=175\text{ }^{\circ}\text{C}$
Gate-emitter threshold voltage	$V_{GE(th)}$	5.0	5.5	6.0	V	$V_{CE}=V_{GE}$, $I_D=0.5\text{ mA}$
Diode forward voltage	V_F		2.9	3.3	V	$V_{GE}=0\text{ V}$, $I_F=120\text{ A}$, $T_{vj}=25\text{ }^{\circ}\text{C}$
			2.62		V	$V_{GE}=0\text{ V}$, $I_F=120\text{ A}$, $T_{vj}=125\text{ }^{\circ}\text{C}$
			2.44		V	$V_{GE}=0\text{ V}$, $I_F=120\text{ A}$, $T_{vj}=175\text{ }^{\circ}\text{C}$
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	$V_{CE}=1200\text{ V}$, $V_{GE}=0\text{ V}$

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{ies}		17994		pF	$V_{GE}=0\text{ V}$, $V_{CE}=25\text{ V}$, $f=100\text{ kHz}$
Output capacitance	C_{oes}		273		pF	
Reverse transfer capacitance	C_{res}		9		pF	
Turn-on delay time	$t_{d(on)}$		119		ns	$V_{GE}=15\text{ V}$, $V_{CC}=600\text{ V}$, $R_G=10\ \Omega$, $I_C=120\text{ A}$
Rise time	t_r		49		ns	
Turn-off delay time	$t_{d(off)}$		274		ns	
Fall time	t_f		77		ns	
Turn-on energy	E_{on}		3.57		mJ	
Turn-off energy	E_{off}		4.03		mJ	
Turn-on delay time	$t_{d(on)}$		113		ns	$V_{GE}=15\text{ V}$, $V_{CC}=600\text{ V}$, $R_G=10\ \Omega$, $I_C=60\text{ A}$
Rise time	t_r		30		ns	
Turn-off delay time	$t_{d(off)}$		316		ns	
Fall time	t_f		47		ns	
Turn-on energy	E_{on}		1.95		mJ	
Turn-off energy	E_{off}		2.18		mJ	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		310		nC	$V_{GE}=15\text{ V}$, $V_{CC}=960\text{ V}$, $I_C=120\text{ A}$
Gate-emitter charge	Q_{ge}		143		nC	
Gate-collector charge	Q_{gc}		52		nC	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode reverse recovery time	t_{rr}		259		ns	$V_R=600\text{ V}$, $I_F=120\text{ A}$, $di_F/dt=500\text{ A}/\mu\text{s}$, $T_{vj}=25\text{ }^\circ\text{C}$
Diode reverse recovery charge	Q_{rr}		2.7		μC	
Diode peak reverse recovery current	I_{rrm}		17.1		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

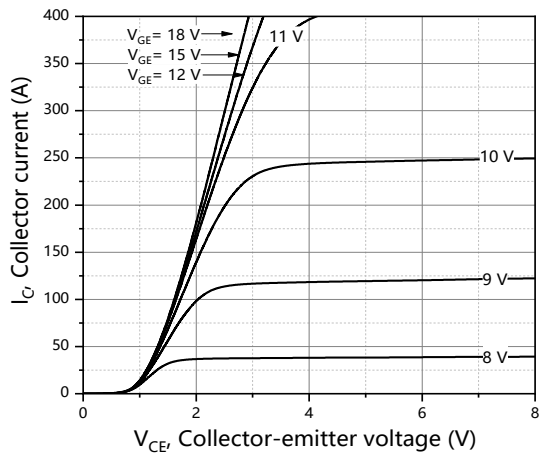


Figure 1. Typical output characteristics
($T_{vj}=25\text{ }^{\circ}\text{C}$)

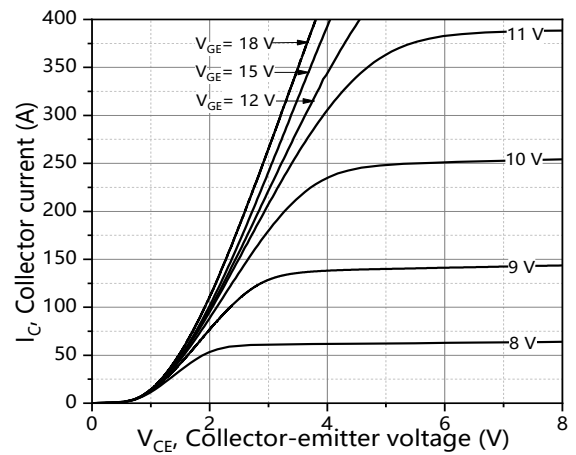


Figure 2. Typical output characteristics
($T_{vj}=150\text{ }^{\circ}\text{C}$)

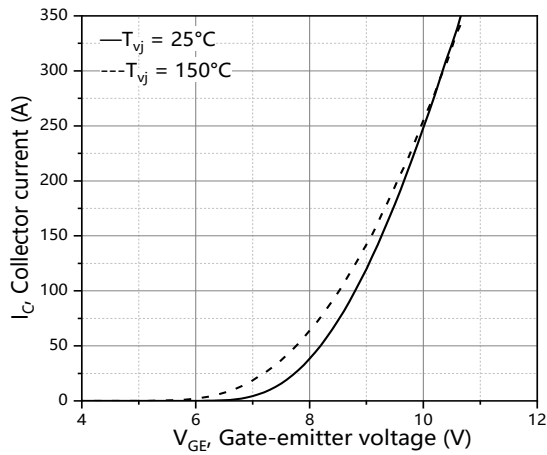


Figure 3. Typical transfer characteristics
($V_{CE}=20\text{ V}$)

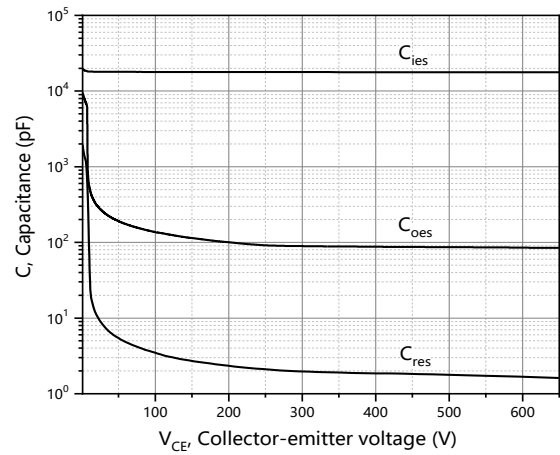


Figure 4. Typical capacitance
($V_{GE}=0\text{ V}$, $f=100\text{ kHz}$)

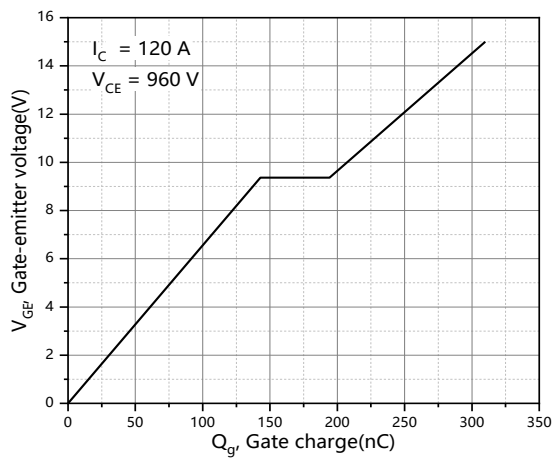


Figure 5. Typical gate charge

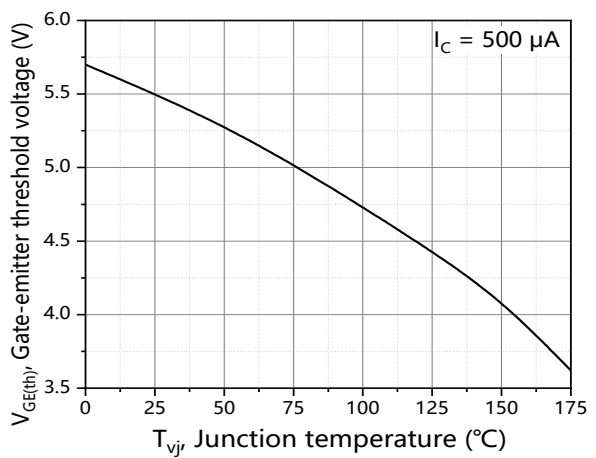


Figure 6. Gate-emitter threshold voltage

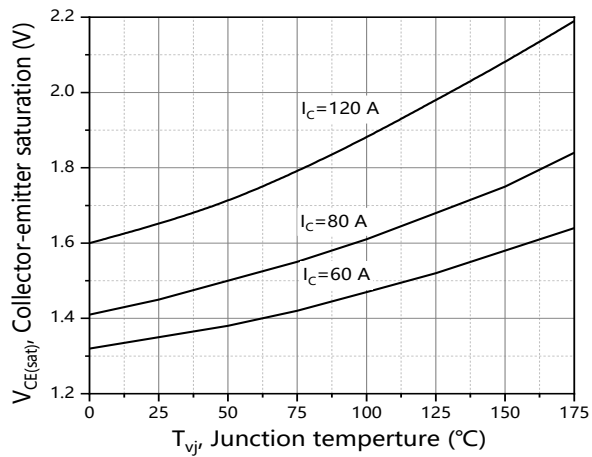


Figure 7. Typical collector-emitter voltage

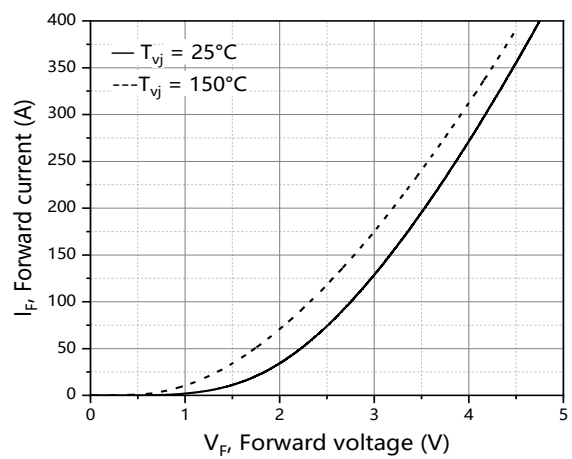


Figure 8. Forward characteristic of diode

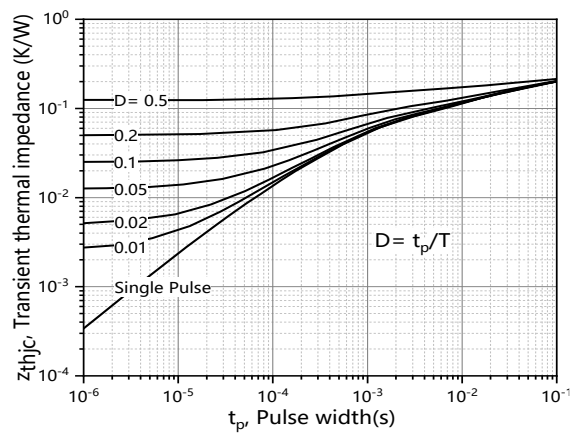


Figure 9. IGBT transient thermal impedance

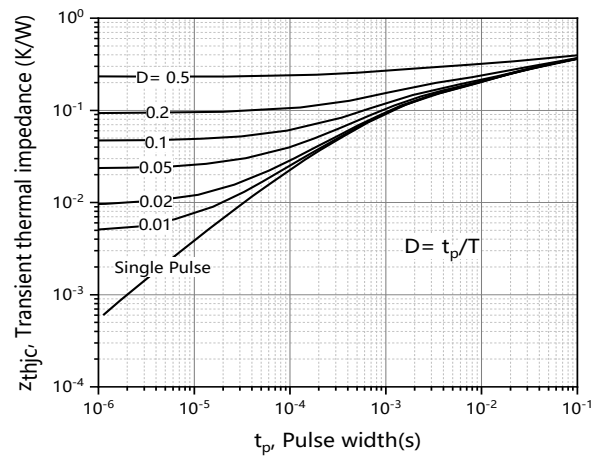


Figure 10. Diode transient thermal impedance

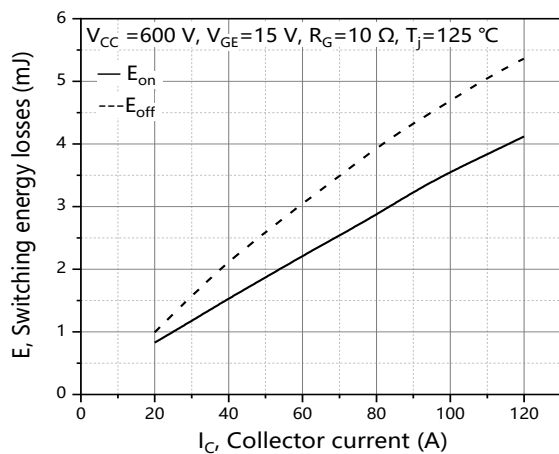
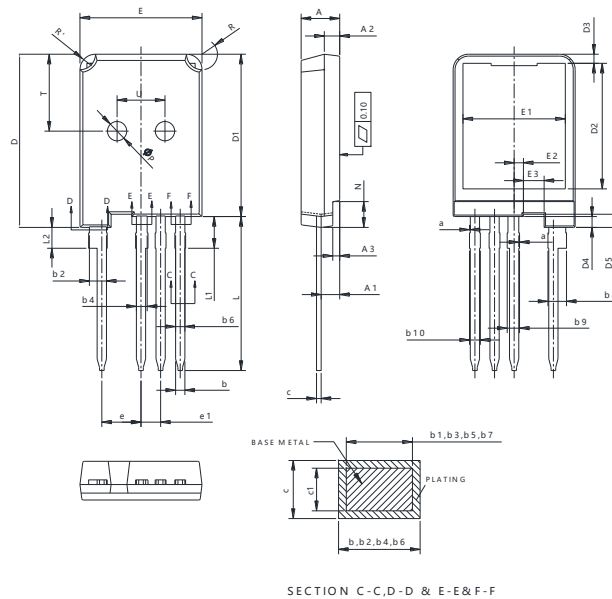


Figure 11. Switching energy vs. collector current

Package Information



Symbol	mm			Symbol	mm		
	Min	Nom	Max		Min	Nom	Max
A	4.90	5.00	5.10	D1	20.90	21.00	21.10
A1	2.31	2.41	2.51	D2	16.05	16.25	16.45
A2	1.90	2.00	2.10	D3	1.02	1.17	1.32
A3	0.80	0.90	1.00	D4	1.30	1.40	1.50
a	0.00	—	0.15	D5	1.60	1.70	1.80
a'	0.00	—	0.15	E	15.70	15.80	15.90
b	1.16	—	1.26	E1	13.06	13.26	13.46
b1	1.15	1.20	1.22	E2	1.10	1.20	1.30
b2	2.16	—	2.26	E3	2.58	2.68	2.78
b3	2.15	2.20	2.22	e	5.080 BSC		
b4	1.36	—	1.46	e1	2.540 BSC		
b5	1.35	1.40	1.42	L	19.80	19.92	21.00
b6	1.16	—	1.26	L1	3.90	4.10	4.30
b7	1.15	1.20	1.22	L2	2.55	2.70	2.85
b8	—	—	2.40	P	2.40	2.50	2.60
b9	—	—	1.60	R	1.90	2.00	2.10
b10	—	—	1.40	R'	1.90	2.00	2.10
c	0.59	0.625	0.66	T	9.75	9.95	10.15
c1	0.59	0.60	0.66	U	6.00	6.20	6.40
D	22.30	22.40	22.50	N	3.24	3.34	3.44

Version 1: TO247-plus-4L-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-4L-J	30	20	600	4	2400

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
OST120N120H7EM2F	TO247-plus-4L	yes	yes	yes

Legal Disclaimer

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, Oriental Semiconductor hereby disclaims any and all warranties and liabilities of any kind, including without limitation, warranties of non-infringement of intellectual property rights of any third party.

For further information on technology, delivery terms and conditions and prices, please contact the Oriental Semiconductor sales representatives (www.orientalsemi.com).

© Oriental Semiconductor Co.,Ltd. All Rights Reserved 