



General Description

OST40N120HUM2AF 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
- Motor drive

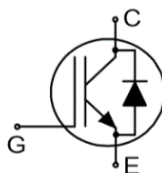
Key Performance Parameters

Parameter	Value	Unit
$V_{CES, min} @ 25\text{ }^{\circ}\text{C}$	1200	V
Maximum junction temperature	175	$^{\circ}\text{C}$
$I_C, pulse$	160	A
$V_{CE(sat), typ} @ V_{GE}=15\text{ V}$	1.67	V
Q_g	175	nC

Marking Information

Product Name	Package	Marking
OST40N120HUM2AF	TO247	OST40N120HUM2A

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	56	A
Continuous collector current ¹⁾ , $T_C = 100\text{ }^{\circ}\text{C}$		40	A
Pulsed collector current ²⁾ , $T_C = 25\text{ }^{\circ}\text{C}$	$I_{C, \text{ pulse}}$	160	A
Diode forward current ¹⁾ , $T_C = 25\text{ }^{\circ}\text{C}$	I_F	56	A
Diode forward current ¹⁾ , $T_C = 100\text{ }^{\circ}\text{C}$		40	A
Diode pulsed current ²⁾ , $T_C = 25\text{ }^{\circ}\text{C}$	$I_{F, \text{ pulse}}$	160	A
Power dissipation ³⁾ , $T_C = 25\text{ }^{\circ}\text{C}$	P_D	395	W
Power dissipation ³⁾ , $T_C = 100\text{ }^{\circ}\text{C}$		197	W
Operation and storage temperature	T_{stg}, T_{vj}	-55 to 175	$^{\circ}\text{C}$
Short circuit withstand time $V_{GE} = 15\text{ V}$, $V_{CC} \leq 600\text{ V}$ Allowed number of short circuits < 1000 Time between short circuits: $\geq 1.0\text{ S}$ $T_{vj} = 25\text{ }^{\circ}\text{C}$	t_{sc}	10	μs

Thermal Characteristics

Parameter	Symbol	Value	Unit
IGBT thermal resistance, junction-case	$R_{\theta JC}$	0.38	$^{\circ}\text{C/W}$
Diode thermal resistance, junction-case	$R_{\theta JC}$	0.75	$^{\circ}\text{C/W}$
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	$V_{CE(sat)}$		1.67	2.1	V	$V_{GE}=15\text{ V}$, $I_C=40\text{ A}$, $T_{vj}=25\text{ }^{\circ}\text{C}$
			2.04		V	$V_{GE}=15\text{ V}$, $I_C=40\text{ A}$, $T_{vj}=125\text{ }^{\circ}\text{C}$
			2.25		V	$V_{GE}=15\text{ V}$, $I_C=40\text{ A}$, $T_{vj}=175\text{ }^{\circ}\text{C}$
Gate-emitter threshold voltage	$V_{GE(th)}$	4.5	5.6	6.5	V	$V_{CE}=V_{GE}$, $I_C=0.5\text{ mA}$
Diode forward voltage	V_F		2.63	3.5	V	$V_{GE}=0\text{ V}$, $I_F=40\text{ A}$, $T_{vj}=25\text{ }^{\circ}\text{C}$
			2.18		V	$V_{GE}=0\text{ V}$, $I_F=40\text{ A}$, $T_{vj}=125\text{ }^{\circ}\text{C}$
			1.96		V	$V_{GE}=0\text{ V}$, $I_F=40\text{ A}$, $T_{vj}=175\text{ }^{\circ}\text{C}$
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}		7237		pF	$V_{GE}=0\text{ V}$, $V_{CE}=25\text{ V}$, $f=100\text{ kHz}$
Output capacitance	C_{oes}		138		pF	
Reverse transfer capacitance	C_{res}		36		pF	
Turn-on delay time	$t_{d(on)}$		55		ns	$V_{GE}=15\text{ V}$, $V_{CC}=600\text{ V}$, $R_G=10\ \Omega$, $I_C=40\text{ A}$
Rise time	t_r		37		ns	
Turn-off delay time	$t_{d(off)}$		185		ns	
Fall time	t_f		235		ns	
Turn-on energy	E_{on}		1.73		mJ	
Turn-off energy	E_{off}		2.51		mJ	
Turn-on delay time	$t_{d(on)}$		51		ns	$V_{GE}=15\text{ V}$, $V_{CC}=600\text{ V}$, $R_G=10\ \Omega$, $I_C=20\text{ A}$
Rise time	t_r		17		ns	
Turn-off delay time	$t_{d(off)}$		232		ns	
Fall time	t_f		213		ns	
Turn-on energy	E_{on}		0.81		mJ	
Turn-off energy	E_{off}		1.48		mJ	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		175		nC	$V_{GE}=15\text{ V}$, $V_{CC}=960\text{ V}$, $I_C=40\text{ A}$
Gate-emitter charge	Q_{ge}		64		nC	
Gate-collector charge	Q_{gc}		56		nC	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode reverse recovery time	t_{rr}		258		ns	$V_R=600\text{ V}$, $I_F=40\text{ A}$, $di_F/dt=500\text{ A}/\mu\text{s}$, $T_{vj}=25\text{ }^\circ\text{C}$
Diode reverse recovery charge	Q_{rr}		1.49		μC	
Diode peak reverse recovery current	I_{rrm}		12		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

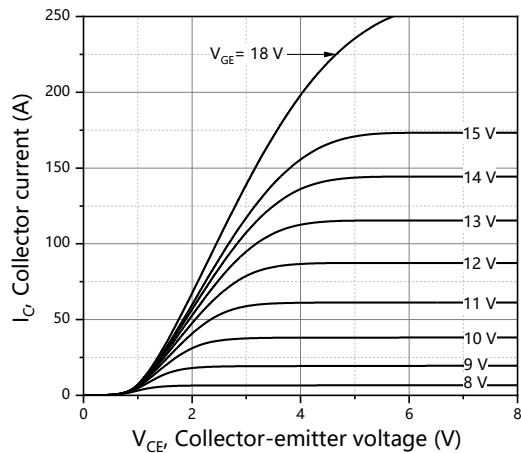


Figure 1. Typical output characteristics
($T_{vj}=25\text{ }^{\circ}\text{C}$)

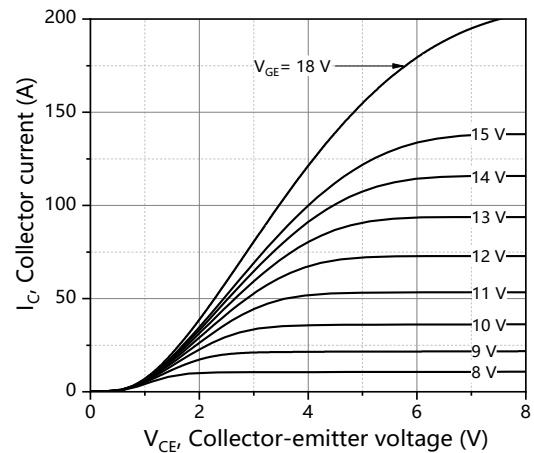


Figure 2. Typical output characteristics
($T_{vj}=150\text{ }^{\circ}\text{C}$)

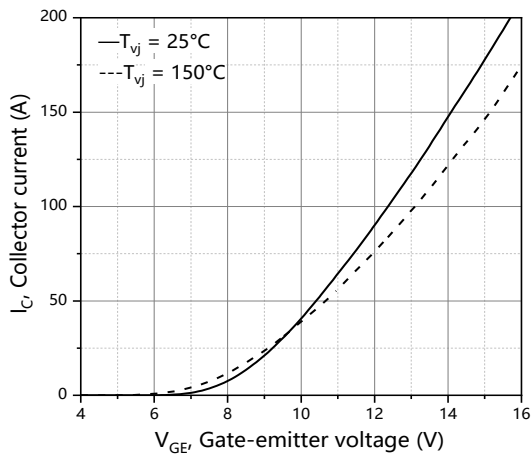


Figure 3. Typical transfer characteristics
($V_{CE}=20\text{ V}$)

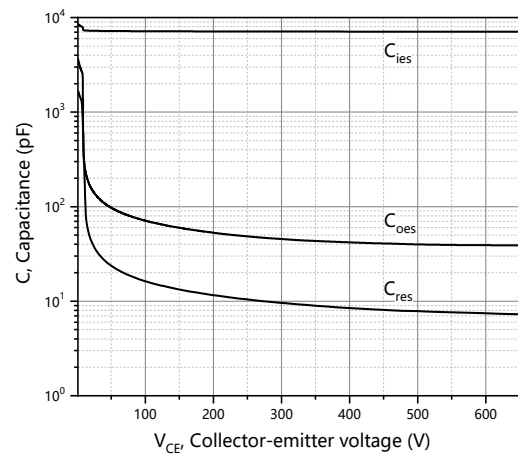


Figure 4. Typical capacitance
($V_{GE}=0\text{ V}$, $f=100\text{ kHz}$)

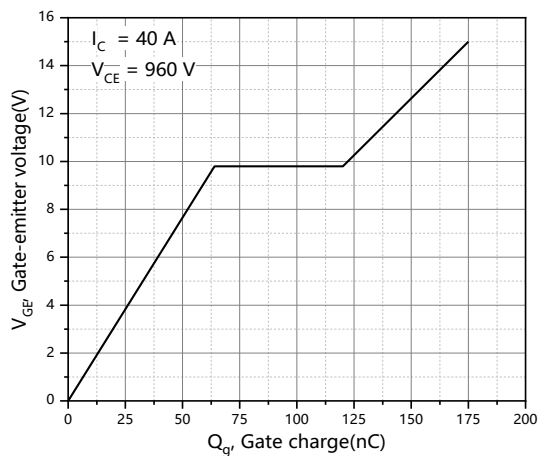


Figure 5. Typical gate charge

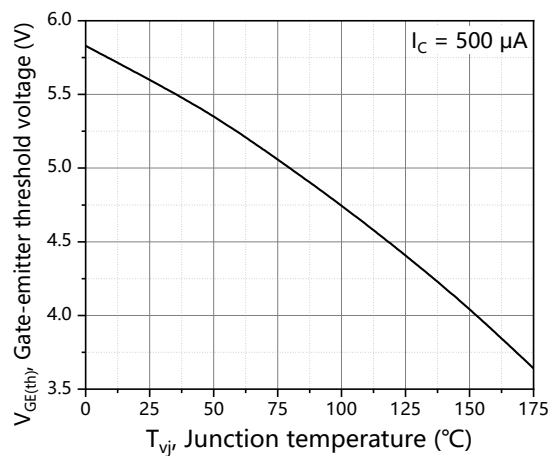


Figure 6. Gate-emitter threshold voltage

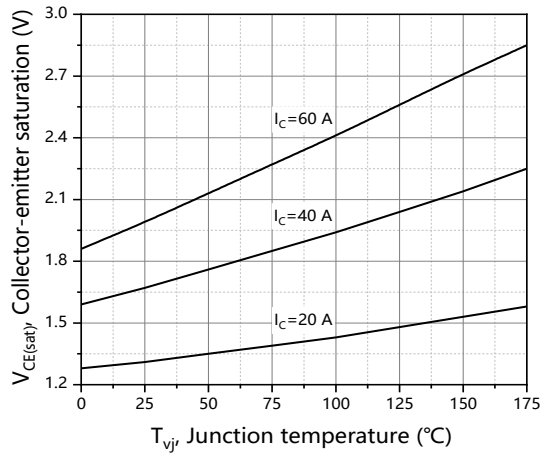


Figure 7. Typical collector-emitter voltage

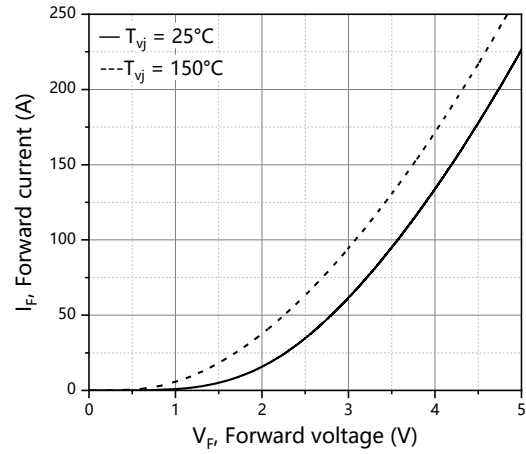


Figure 8. Forward characteristic of diode

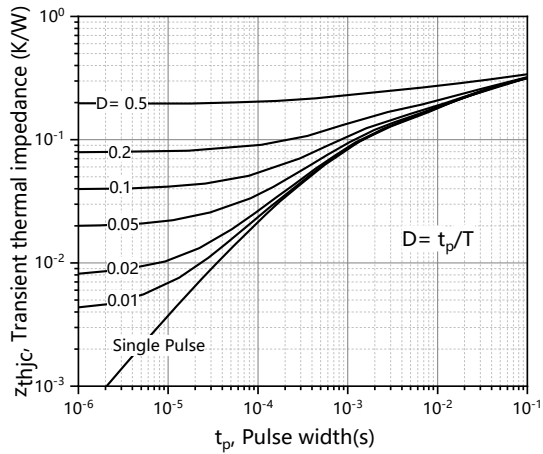


Figure 9. IGBT transient thermal impedance

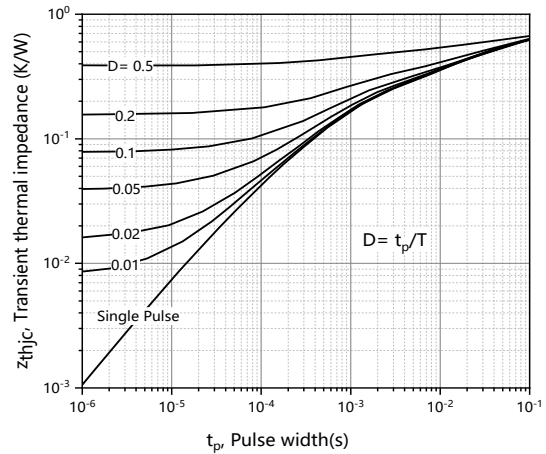


Figure 10. Diode transient thermal impedance

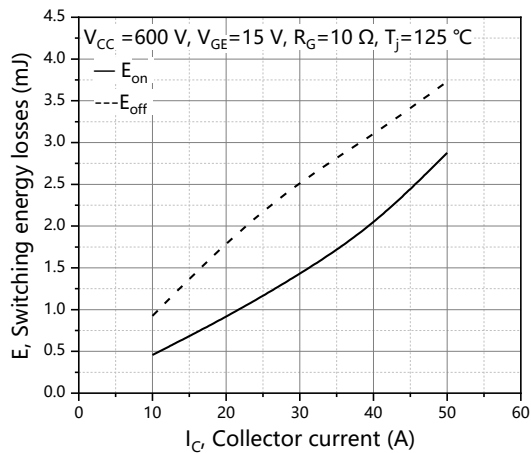
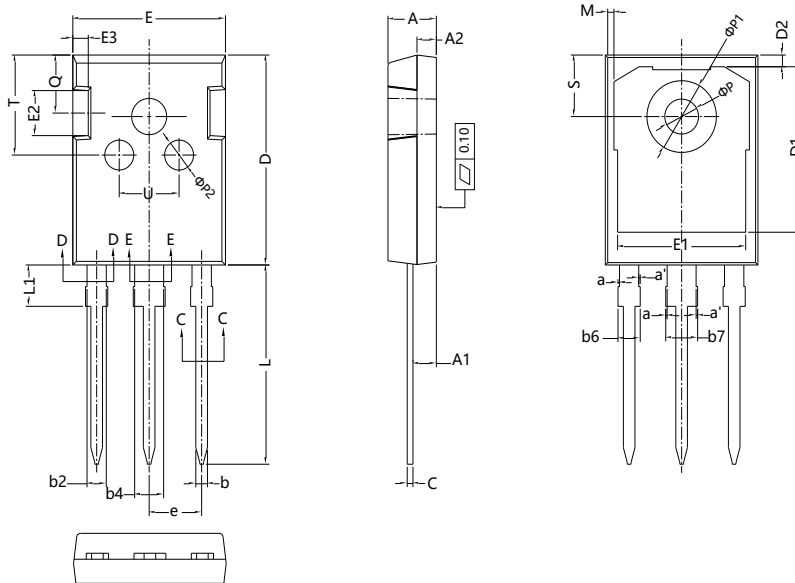


Figure 11. Switching energy vs. collector current

Package Information



Symbol	mm		
	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
b2	1.96	-	2.06
b4	2.96	-	3.06
b6	-	-	2.25
b7	-	-	3.25
c	0.59	-	0.66
D	20.90	21.00	21.10
D1	16.25	16.55	16.85
D2	1.05	1.17	1.35
E	15.70	15.80	15.90
E1	13.10	13.30	13.50
E2	4.40	4.50	4.60
E3	1.50	1.60	1.70
e	5.436 BSC		
L	19.80	19.92	20.10
L1	-	-	4.30
M	0.35	-	0.95
P	3.40	3.50	3.60
P1	7.00	-	7.40
P2	2.40	2.5	2.6
Q	5.60	-	6.0
S	6.05	6.15	6.25
T	9.8	-	10.20
U	6.00	-	6.40

Version : TO247-J package outline dimension

Ordering Information

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

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
OST40N120HUM2AF	TO247	yes	yes	yes

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