



General Description

OST20N65FMF 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

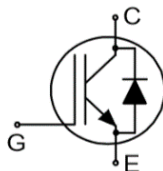
Key Performance Parameters

Parameter	Value	Unit
$V_{CES, min} @ 25\text{ }^{\circ}\text{C}$	650	V
Maximum junction temperature	175	$^{\circ}\text{C}$
$I_C, \text{ pulse}$	80	A
$V_{CE(sat), typ} @ V_{GE}=15\text{ V}$	1.73	V
Q_g	48	nC

Marking Information

Product Name	Package	Marking
OST20N65FMF	TO220F	OST20N65FM

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}	650	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	40	A
Continuous collector current ¹⁾ , $T_C = 100\text{ }^{\circ}\text{C}$		20	A
Pulsed collector current ²⁾ , $T_C = 25\text{ }^{\circ}\text{C}$	$I_{C, \text{ pulse}}$	80	A
Diode forward current ¹⁾ , $T_C = 25\text{ }^{\circ}\text{C}$	I_F	40	A
Diode forward current ¹⁾ , $T_C = 100\text{ }^{\circ}\text{C}$		20	A
Diode pulsed current ²⁾ , $T_C = 25\text{ }^{\circ}\text{C}$	$I_{F, \text{ pulse}}$	80	A
Power dissipation ³⁾ , $T_C = 25\text{ }^{\circ}\text{C}$	P_D	59	W
Power dissipation ³⁾ , $T_C = 100\text{ }^{\circ}\text{C}$		30	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: $\geq 1.0\text{ S}$ $T_{vj} = 25\text{ }^{\circ}\text{C}$	t_{sc}	7	μs

Thermal Characteristics

Parameter	Symbol	Value	Unit
IGBT thermal resistance, junction-case	$R_{\theta JC}$	2.53	$^{\circ}\text{C/W}$
Diode thermal resistance, junction-case	$R_{\theta JC}$	4.38	$^{\circ}\text{C/W}$
Thermal resistance, junction-ambient	$R_{\theta JA}$	62.5	$^{\circ}\text{C/W}$

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	$V_{(BR)CES}$	650			V	$V_{GE}=0\text{ V}$, $I_C=0.5\text{ mA}$
Collector-emitter saturation voltage	$V_{CE(sat)}$		1.73	2.0	V	$V_{GE}=15\text{ V}$, $I_C=20\text{ A}$, $T_{vj}=25\text{ }^{\circ}\text{C}$
			2.08		V	$V_{GE}=15\text{ V}$, $I_C=20\text{ A}$, $T_{vj}=125\text{ }^{\circ}\text{C}$
			2.27		V	$V_{GE}=15\text{ V}$, $I_C=20\text{ A}$, $T_{vj}=175\text{ }^{\circ}\text{C}$
Gate-emitter threshold voltage	$V_{GE(th)}$	5.5	6.0	6.5	V	$V_{CE}=V_{GE}$, $I_C=0.5\text{ mA}$
Diode forward voltage	V_F		1.80		V	$V_{GE}=0\text{ V}$, $I_F=20\text{ A}$, $T_{vj}=25\text{ }^{\circ}\text{C}$
			1.72		V	$V_{GE}=0\text{ V}$, $I_F=20\text{ A}$, $T_{vj}=125\text{ }^{\circ}\text{C}$
			1.66		V	$V_{GE}=0\text{ V}$, $I_F=20\text{ A}$, $T_{vj}=175\text{ }^{\circ}\text{C}$
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	$V_{CE}=650\text{ V}$, $V_{GE}=0\text{ V}$

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{ies}		1873		pF	$V_{GE}=0\text{ V}$, $V_{CE}=25\text{ V}$, $f=100\text{ kHz}$
Output capacitance	C_{oes}		46		pF	
Reverse transfer capacitance	C_{res}		13		pF	
Turn-on delay time	$t_{d(on)}$		21		ns	$V_{GE}=15\text{ V}$, $V_{CC}=400\text{ V}$, $R_G=10\ \Omega$, $I_C=20\text{ A}$, $T_{vj}=25\text{ }^\circ\text{C}$
Rise time	t_r		37		ns	
Turn-off delay time	$t_{d(off)}$		61		ns	
Fall time	t_f		56		ns	
Turn-on energy	E_{on}		0.69		mJ	
Turn-off energy	E_{off}		0.31		mJ	
Turn-on delay time	$t_{d(on)}$		20		ns	$V_{GE}=15\text{ V}$, $V_{CC}=400\text{ V}$, $R_G=10\ \Omega$, $I_C=10\text{ A}$, $T_{vj}=25\text{ }^\circ\text{C}$
Rise time	t_r		14		ns	
Turn-off delay time	$t_{d(off)}$		86		ns	
Fall time	t_f		65		ns	
Turn-on energy	E_{on}		0.29		mJ	
Turn-off energy	E_{off}		0.18		mJ	
Turn-on delay time	$t_{d(on)}$		21		ns	$V_{GE}=15\text{ V}$, $V_{CC}=400\text{ V}$, $R_G=10\ \Omega$, $I_C=20\text{ A}$, $T_{vj}=175\text{ }^\circ\text{C}$
Rise time	t_r		37		ns	
Turn-off delay time	$t_{d(off)}$		71		ns	
Fall time	t_f		82		ns	
Turn-on energy	E_{on}		1.04		mJ	
Turn-off energy	E_{off}		0.42		mJ	
Turn-on delay time	$t_{d(on)}$		19		ns	$V_{GE}=15\text{ V}$, $V_{CC}=400\text{ V}$, $R_G=10\ \Omega$, $I_C=10\text{ A}$, $T_{vj}=175\text{ }^\circ\text{C}$
Rise time	t_r		15		ns	
Turn-off delay time	$t_{d(off)}$		100		ns	
Fall time	t_f		89		ns	
Turn-on energy	E_{on}		0.46		mJ	
Turn-off energy	E_{off}		0.23		mJ	



Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		48		nC	$V_{GE}=15\text{ V}$, $V_{CC}=520\text{ V}$, $I_C=20\text{ A}$
Gate-emitter charge	Q_{ge}		20		nC	
Gate-collector charge	Q_{gc}		12		nC	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode reverse recovery time	t_{rr}		86		ns	$V_R=400\text{ V}$, $I_F=20\text{ A}$, $di_F/dt=500\text{ A}/\mu\text{s}$, $T_{vj}=25\text{ }^\circ\text{C}$
Diode reverse recovery charge	Q_{rr}		0.59		μC	
Diode peak reverse recovery current	I_{rrm}		14		A	
Diode reverse recovery time	t_{rr}		134		ns	$V_R=400\text{ V}$, $I_F=20\text{ A}$, $di_F/dt=500\text{ A}/\mu\text{s}$, $T_{vj}=175\text{ }^\circ\text{C}$
Diode reverse recovery charge	Q_{rr}		1.22		μC	
Diode peak reverse recovery current	I_{rrm}		19		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

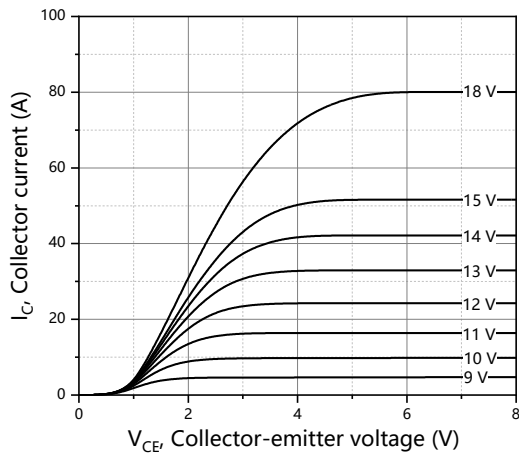


Figure 1. Typical output characteristics
($T_{vj}=25\text{ }^{\circ}\text{C}$)

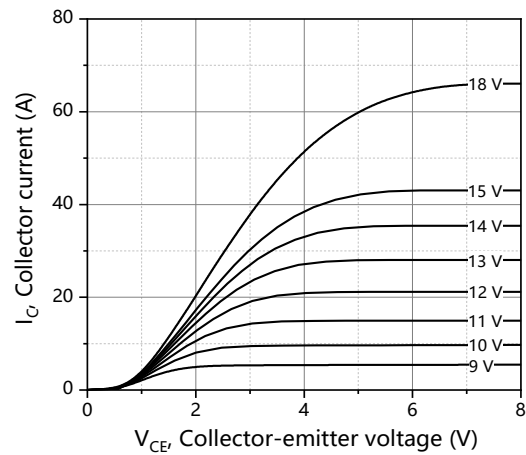


Figure 2. Typical output characteristics
($T_{vj}=150\text{ }^{\circ}\text{C}$)

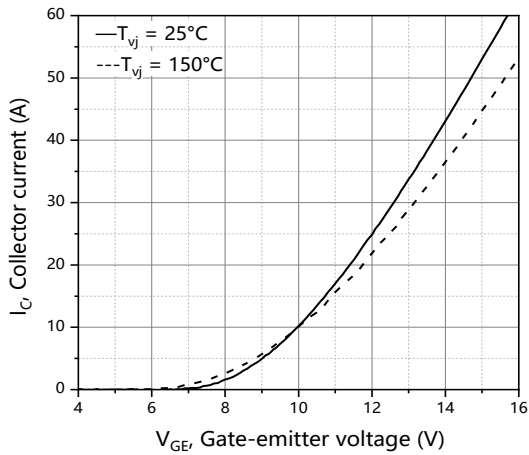


Figure 3. Typical transfer characteristics
($V_{CE}=20\text{ V}$)

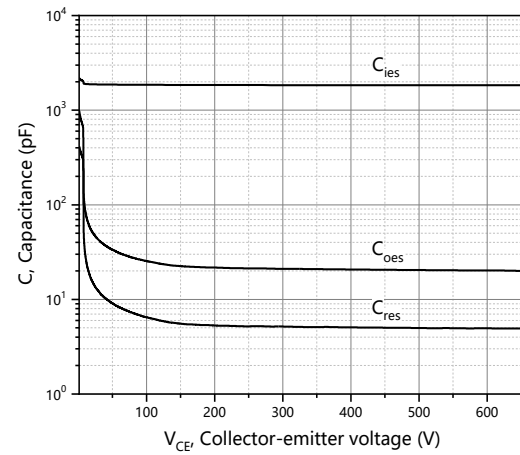


Figure 4. Typical capacitance
($V_{GE}=0\text{ V}$, $f=100\text{ kHz}$)

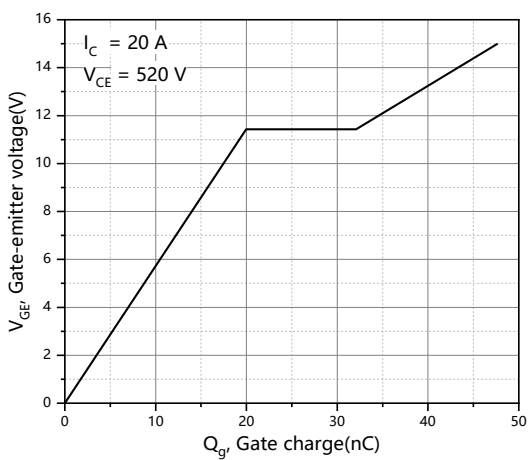


Figure 5. Typical gate charge

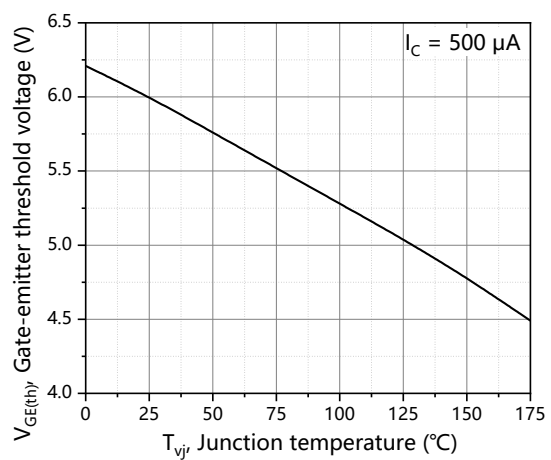


Figure 6. Gate-emitter threshold voltage

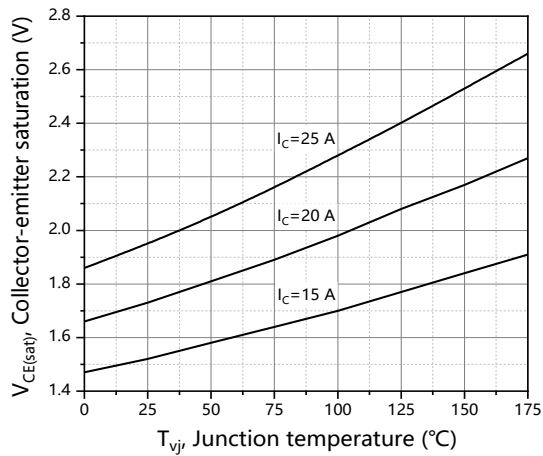


Figure 7. Typical collector-emitter voltage

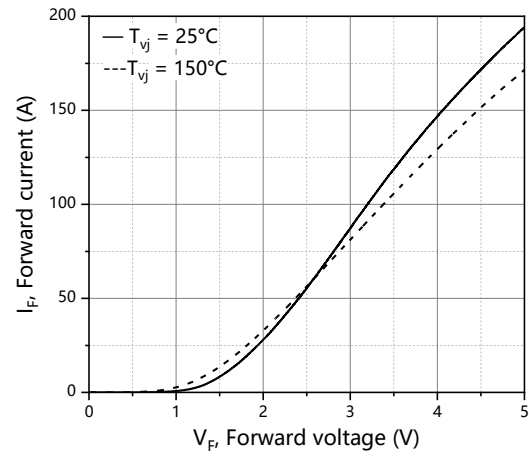


Figure 8. Forward characteristic of diode

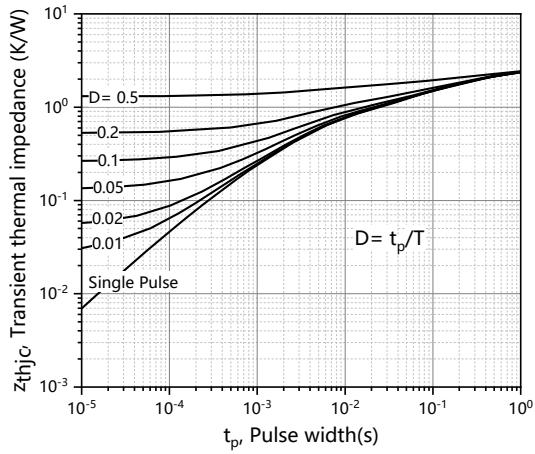


Figure 9. IGBT transient thermal impedance

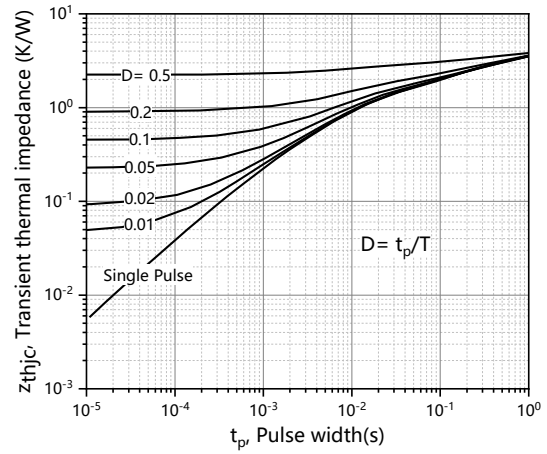
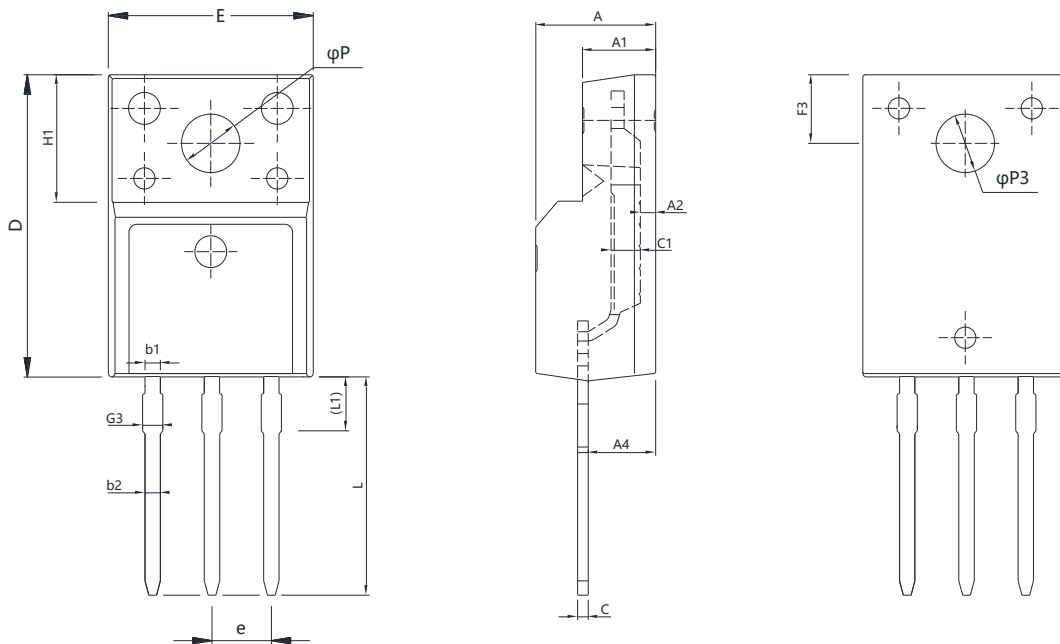


Figure 10. Diode transient thermal impedance

Package Information



Symbol	mm		
	Min	Nom	Max
E	9.96	10.16	10.36
A	4.50	4.70	4.90
A1	2.34	2.54	2.74
A2	0.30	0.45	0.60
A4	2.56	2.76	2.96
c	0.40	0.50	0.65
C1	1.20	1.30	1.35
D	15.57	15.87	16.17
H1	6.70REF		
e	2.54BSC		
L	12.68	12.98	13.28
L1	2.88	3.03	3.18
ΦP	3.03	3.18	3.38
ΦP3	3.15	3.45	3.65
F3	3.15	3.30	3.45
G3	1.25	1.35	1.55
b1	1.18	1.28	1.43
b2	0.70	0.80	0.95

Version : TO220F-P package outline dimension

Ordering Information

Package Type	Units/ Tube	Tubes/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
TO220F-P	50	20	1000	6	6000

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
OST20N65FMF	TO220F	yes	yes	yes

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Revision History

Version	Revision History	Data
V1.0	Initial release	2025-07-30