General Description

OST40N65TEMFuses advanced Oriental-Semi's patented Trident-Gate Bipolar Transistor (TGBT^{TM}) 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^{TM} technology
- Excellent conduction and switching loss
- Excellent stability and uniformity
- Fast and soft antiparallel diode

RoHS compliant

Applications

- Induction converters
- Uninterruptible power supplies

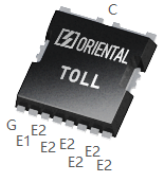
Key Performance Parameters

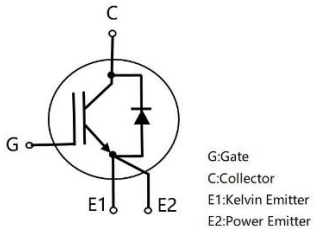
Parameter	Value	Unit
$V_{CES, min}$ @ 25°C	650	V
Maximum junction temperature	175	°C
$I_{C, pulse}$	160	A
$V_{CE(sat), typ}$ @ V_{GE}=15V	1.55	V
Q_g	79	nC

Marking Information

Product Name	Package	Marking
OST40N65TEMF	TOLL	OST40N65TEM

Package & Pin Information





Absolute Maximum Ratings at T_{vj}=25°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≤10μs, D<0.01		±30	V
Continuous collector current[1], T_C=25℃	I_C	68	A
Continuous collector current[1], T_C=100℃		40	A
Pulsed collector current[2], T_C=25℃	$I_{C, pulse}$	160	A
Diode forward current[1], T_C=25℃	I_F	68	A
Diode forward current[1], T_C=100℃		40	A
Diode pulsed current[2], T_C=25℃	$I_{F, pulse}$	160	A
Power dissipation[3], T_C=25℃	P_D	250	W
Power dissipation[3], T_C=100℃		125	W
Operation and storage temperature	T_{stg}, T_{vj}	-55 to 175	°C

Thermal Characteristics

Parameter	Symbol	Value	Unit
IGBT thermal resistance, junction-case	$R_{θJC}$	0.60	°C/W
Diode thermal resistance, junction-case	$R_{θJC}$	0.85	°C/W
Thermal resistance, junction-ambient[4]	$R_{θJA}$	40	°C/W

Electrical Characteristics at T_{vj}=25°C unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Collector-emitter breakdown voltage	$V_{(BR)CES}$	650			V	V_{GE}=0 V, I_C=0.5 mA
Collector-emitter saturation voltage	$V_{CE(sat)}$		1.55	1.85	V	V_{GE}=15 V, I_C=40 A T_{vj}=25°C
			1.87		V	V_{GE}=15 V, I_C=40 A, T_{vj} =125°C
			2.05		V	V_{GE}=15 V, I_C=40 A, T_{vj} =175°C
Gate-emitter threshold voltage	$V_{GE(th)}$	3.5	4.5	5.5	V	V_{CE}=V_{GE}, I_D=0.5 mA
Diode forward voltage	V_F		1.58	2.05	V	V_{GE}=0 V, I_F=40 A T_{vj} =25°C
			1.48		V	V_{GE}=0 V, I_F=40 A, T_{vj} =125°C
			1.41		V	V_{GE}=0 V, I_F=40 A, T_{vj} =175°C
Gate-emitter leakage current	I_{GES}			100	nA	V_{CE}=0 V, V_{GE}=20 V
Zero gate voltage collector current	I_{CES}			10	μA	V_{CE}=650 V, V_{GE}=0 V

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{ies}		4161		pF	V_{GE}=0 V, V_{CE}=25 V, f=100 kHz
Output capacitance	C_{oes}		119		pF	
Reverse transfer capacitance	C_{res}		5.5		pF	
Turn-on delay time	$t_{d(on)}$		28		ns	V_{GE}=15 V, V_{CC}=400 V, R_G=10 Ω, I_C=40 A
Rise time	t_r		13		ns	
Turn-off delay time	$t_{d(off)}$		105		ns	
Fall time	t_f		31		ns	
Turn-on energy	E_{on}		0.94		mJ	
Turn-off energy	E_{off}		0.40		mJ	
Turn-on delay time	$t_{d(on)}$		25		ns	V_{GE}=15 V, V_{CC}=400 V, R_G=10 Ω, I_C=20 A
Rise time	t_r		9.3		ns	
Turn-off delay time	$t_{d(off)}$		124		ns	
Fall time	t_f		27		ns	
Turn-on energy	E_{on}		0.47		mJ	
Turn-off energy	E_{off}		0.20		mJ	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		79		nC	V_{GE}=15 V, V_{CC}=520 V, I_C=40 A
Gate-emitter charge	Q_{ge}		31		nC	
Gate-collector charge	Q_{gc}		18		nC	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode reverse recovery time	t_{rr}		143		ns	V_R=400 V, I_F=40 A, di_F/dt=500 A/μs T_{vj} = 25°C
Diode reverse recovery charge	Q_{rr}		960		nC	
Diode peak reverse recovery current	I_{rrm}		15		A	

Note

1) Calculated continuous current based on maximum allowable junction temperature.
2) Repetitive rating; pulse width limited by max. junction temperature.
3) Pd is based on max. junction temperature, using junction-case thermal resistance.
4) The value of $R_{\theta JA}$ is measured with the device mounted on 1 in^2 FR-4 board with 2oz. Copper, in a still air environment with T_a=25 °C.

Electrical Characteristics Diagrams

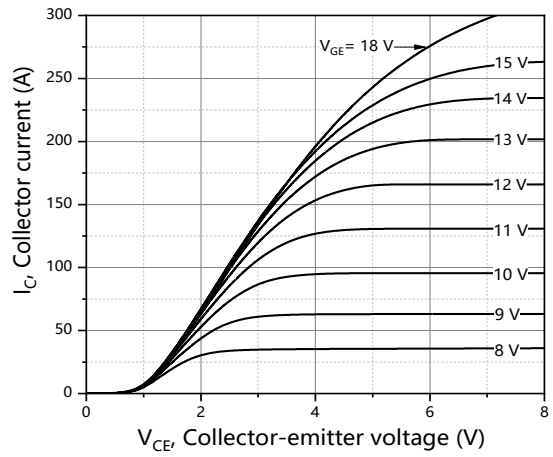


Figure 1. Typical output characteristics
(T_{vj}=25°C)

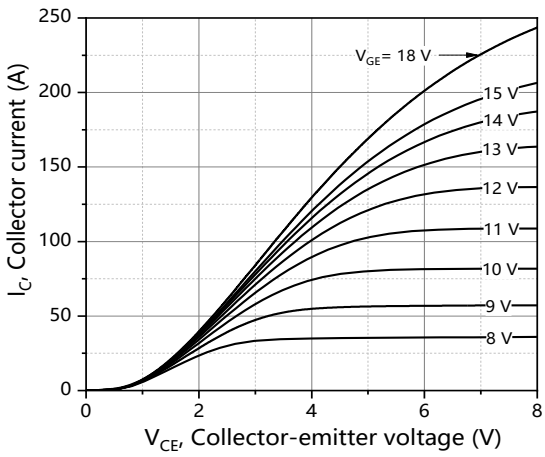


Figure 2. Typical output characteristics
(T_{vj}=150°C)

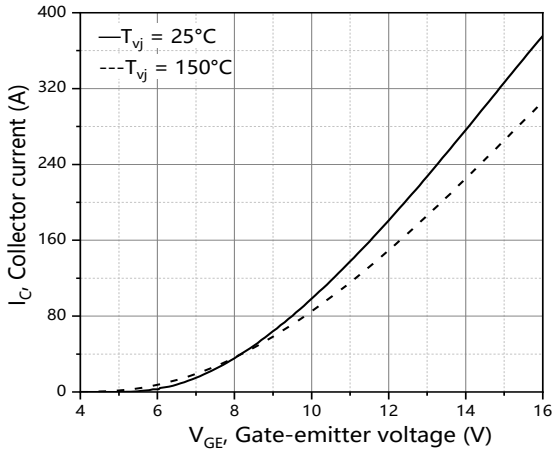


Figure 3. Typical transfer characteristics
(V_{CE}=20V)

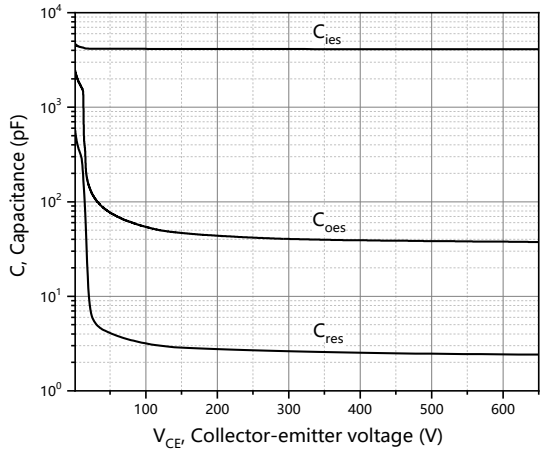


Figure 4. Typical capacitance
(V_{GE}=0V, f=100 kHz)

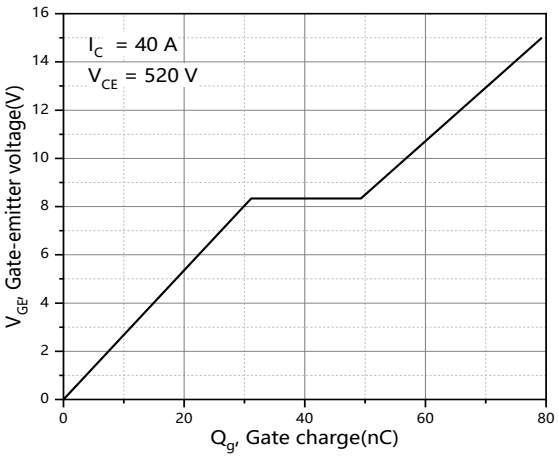


Figure 5. Typical gate charge

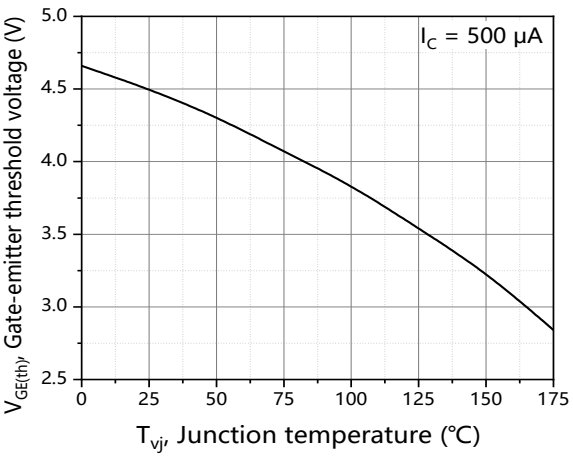


Figure 6. Gate-emitter threshold voltage

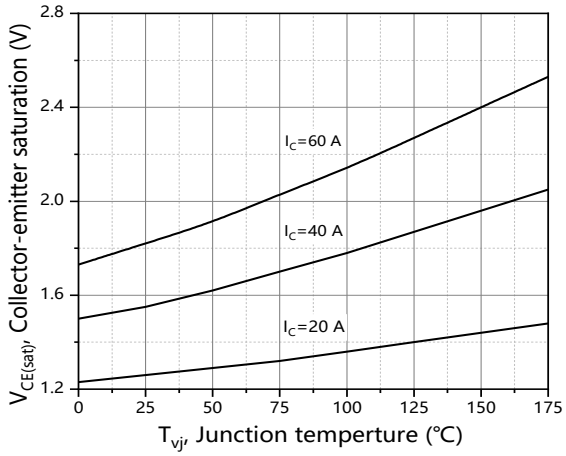


Figure 7. Typical collector-emitter voltage

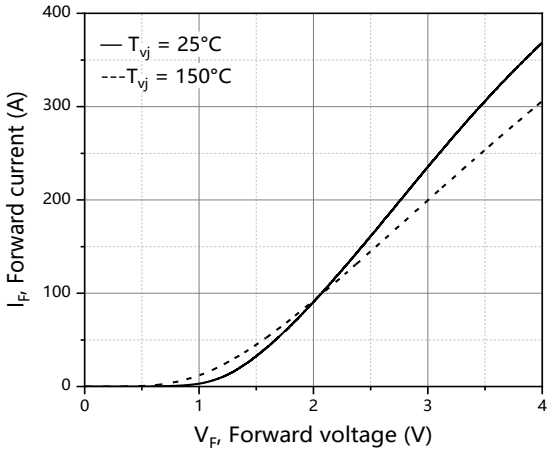


Figure 8. Forward characteristic of diode

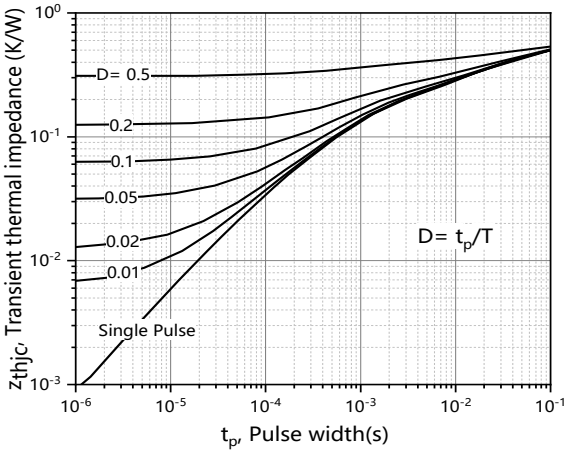


Figure 9. IGBT transient thermal impedance

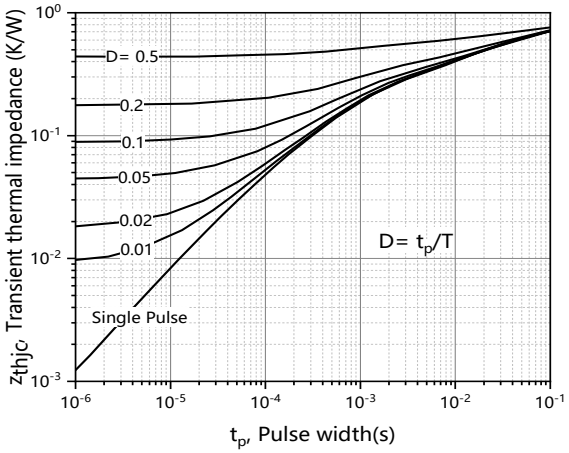
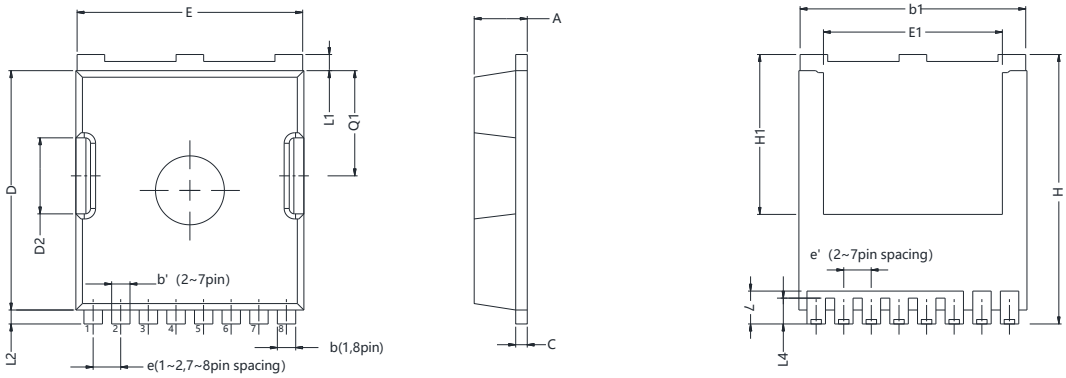


Figure 10. Diode transient thermal impedance

Package Information



Symbol	mm		
	Min	Nom	Max
A	2.15	2.30	2.45
b	0.75	0.75	0.85
b'	0.70	0.70	0.80
b1	9.65	9.80	9.95
C	0.45	0.50	0.60
D	10.18	10.38	10.58
D2	3.15	3.30	3.45
E	9.70	9.90	10.10
E1	7.95	8.10	8.25
e	BSC 1.225		
e'	BSC 1.20		
Q1	4.40	4.55	4.70
H	11.48	11.68	11.88
H1	6.80	6.95	7.10
L	1.60	1.80	2.00
L1	0.50	0.70	0.90
L2	0.48	0.60	0.72
L4	1.00	1.15	1.30

Version 1: TOLL-P package outline dimension

Ordering Information

Package Type	Units/ Reel	Tubes/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
TOLL-P	1200	1	1200	5	6000

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
OST40N65TEMF	TOLL	yes	yes	yes

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