VGTF065N400NA

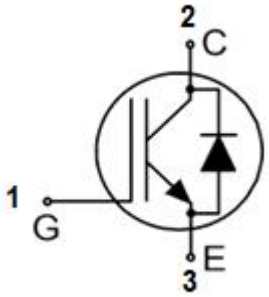
Datasheet

40A, 650V, Insulated Gate Bipolar Transistor VGTF065N400NA

General Description

V_{CE}	650	V
I_C	40	A
V_{CEsat}.Typ T_{vj} = 25 °C	1.65	V
T_{jmax}	175	℃

Symbol



Symbol of VGTF065N400NA

Features

- Offers high breakdown voltage to 650V for improved reliability
- Low V_{CEsat}
- Easy parallel switching capability due to positive temperature coefficient in V_{CEsat}
- Powerful monolithic body diode with low forward voltage designed for soft commutation only
- Very tight parameter distribution
- Qualified according to JEDEC for target applications
- RoHS product
- Halogen and antimony free. "Green" Device

Package Type

TO-247

Package Type of VGTF065N400NA

Application

- Solar converters
- Uninterruptible power supplies
- Welding converters
- Mid to high range switching frequency converters

Product Validation

- Qualified for industrial applications according to the relevant tests of JESD-022

Ordering Information

Product Name	Package
VGTF065N400NA	TO-247

Absolute Maximum Ratings (T_A= 25 ºC, unless otherwise specified)

Parameter		Symbol	Rating	Unit
Collector-emitter voltage		V_{CE}	650	V
DC collector current, limited by $T_{vj\ max}$	Tc = 25 °C	I_C	80	A
	Tc = 100 °C		40	
Pulsed collector current, tp limited by $T_{vj\ max}$		$I_{C,pulse}$	120	A
Diode forward current, limited by T_{vjmax}	Tc = 25 °C	I_F	80	A
	Tc = 100 °C		40	
Diode pulsed current, tp limited by T_{vjmax}		$I_{F,pulse}$	120	A
Gate-emitter voltage		V_{GE}	±20	V
Power dissipation	Tc = 25 °C	Ptot	357	W
	Tc = 100 °C		179	
Operating junction temperature		Tstg	-40 to 175	ºC
Soldering temperature, wave soldering 1.6mm (0.063in.) from case for 10s		T_L	260	ºC

Thermal Resistance

Parameter	Symbol	Min	Typ	Max	Unit
Diode Thermal Resistance, Junction to Case max.	$R_{\theta JC}$	-	0.42	-	ºC/W
Thermal Resistance, Junction to Ambient max.	$R_{\theta JA}$	-	40	-	

Electrical Characteristics (T_J= 25 ºC, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Statistic Characteristics						
Collector-emitter breakdown voltage	$V_{(BR)CES}$	V_{GE}=0V, I_C=1mA	650	-	-	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	V_{GE}=15V, I_C=40A,T_{vj}=25ºC	-	1.65	1.95	V
		V_{GE}=15V, I_C=40A,T_{vj}=125ºC	-	1.90	2.20	
		V_{GE}=15V, I_C=40A,T_{vj}=175ºC	-	2.00	2.30	V
Diode forward voltage	V_F	V_{GE}=0V, I_C=40A,T_{vj}=25ºC	-	2.30	3.30	V
		V_{GE}=0V, I_C=40A,T_{vj}=175ºC	-	1.80	2.80	V
Gate-emitter threshold voltage	$V_{GE(th)}$	V_{GE}=V_{CE}, I_C=1mA	4.0	-	6.0	V
Zero voltage gate collector current	I_{CES}	V_{CE}=650V,V_{GE}=0V,T_{vj}=25ºC	-	-	0.1	mA
		V_{CE}=650V,V_{GE}=0V,T_{vj}=175ºC	-	-	8.0	mA
Gate-emitter leakage current	I_{GES}	V_{GE}=20V, V_{CE}=0V	-	-	200	nA
Dynamic Characteristics						
Input Capacitance	C_{ies}	V_{CE}=25V V_{GE}=0V f=1MHz	-	3489	-	pF
Output Capacitance	C_{oes}		-	113	-	pF
Reverse Transfer Capacitance	C_{res}		-	42	-	pF
Gate total charge	Q_G	V_{CE}=400V V_{GE}=15V I_C=40A	-	276	-	nC
Gate-Emitter charge	Q_{GE}		-	40	-	
Gate-Collector charge	Q_{GC}		-	30	-	
Switching Characteristic, Inductive Load IGBT Characteristic						
Turn-on delay time	$t_{d(on)}$	T_{Vj} = 25°C V_{CE}=400V V_{GE}=15V I_C=40A R_G=10Ω	-	46	-	ns
Rise time	t_r		-	106	-	ns
Turn-off delay time	$t_{d(off)}$		-	150	-	ns
Fall time	t_f		-	95	-	ns
Turn-on energy	Eon		-	0.86	-	mj
Turn-off energy	Eoff		-	0.87	-	mj
Turn-on delay time	$t_{d(on)}$	T_{Vj} = 175°C V_{CE}=400V V_{GE}=15V I_C=40A R_G=10Ω	-	48	-	ns
Rise time	t_r		-	90	-	ns
Turn-off delay time	$t_{d(off)}$		-	169	-	ns
Fall time	t_f		-	94	-	ns
Turn-on energy	Eon		-	0.89	-	mj
Turn-off energy	Eoff		-	0.97	-	mj
Diode reverse recovery time	t_{rr}	T_{Vj} = 25°C V_R=400V I_F=40A, d_{iF}/dt=200A/us	-	46	-	ns
Diode reverse recovery charge	Q_{rr}		-	0.14	-	μC
Diode peak reverse recovery current	I_{rrm}		-	8	-	A

Continue

Diode reverse recovery time	t_{rr}	T_{Vj} = 175°C V_R=400V I_F=40A, d_{iF}/dt=200A/us	-	139	-	ns
Diode reverse recovery charge	Q_{rr}		-	0.91	-	μC
Diode peak reverse recovery current	I_{rrm}		-	14.4	-	A

Typical Performance Characteristics

Fig 1: Capacitance Characteristics

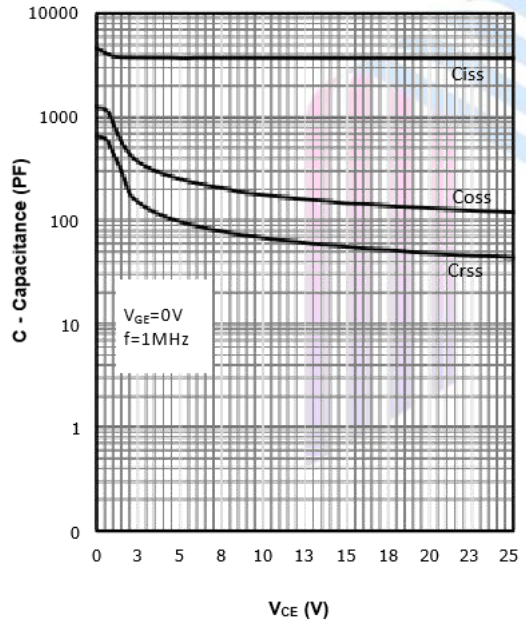


Fig 2: Typical switching Energy vs. Rg Characteristics(Tc=25°C)

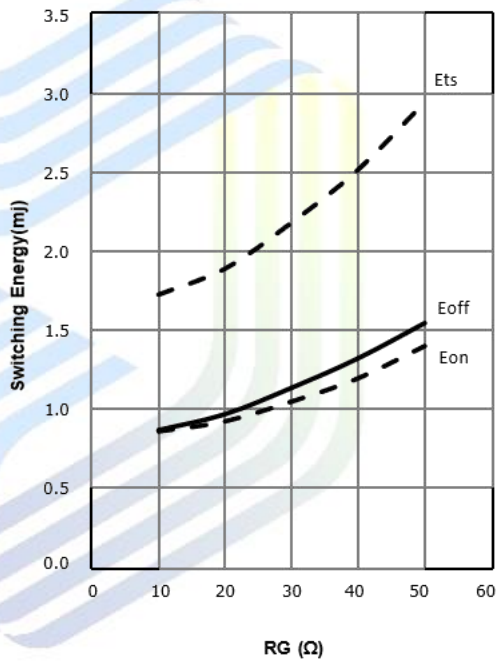


Fig 3: Typical switching time Vs Rg Characteristics(Tc=25℃)

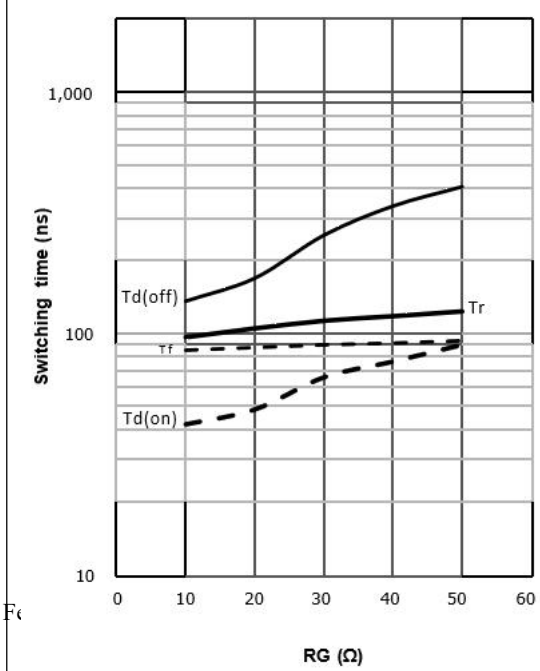


Fig 4: Transfer Characteristics

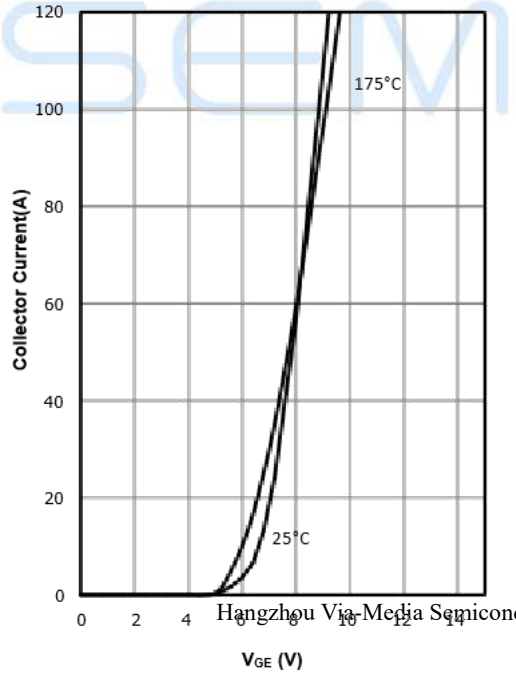


Fig 5: Diode peak reverse recovery curren vs. Temperature

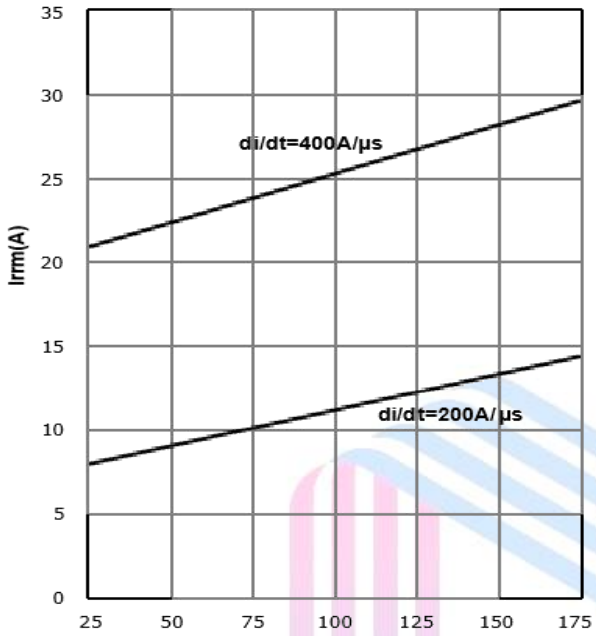


Fig 6: Diode reverse recovery time vs. Temperature

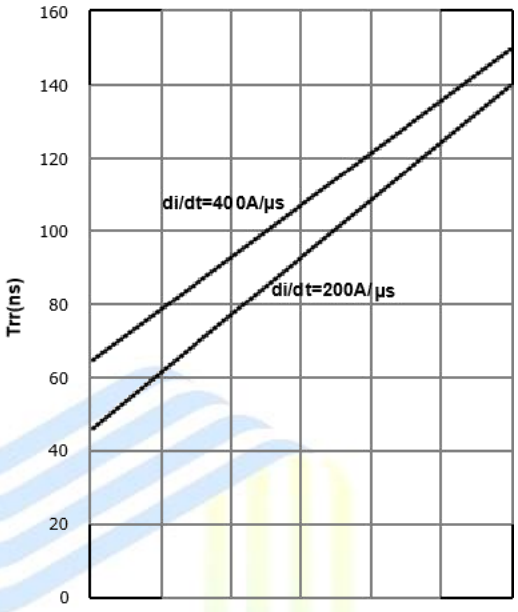


Fig 7: Diode reverse recovery charge vs. Temperature

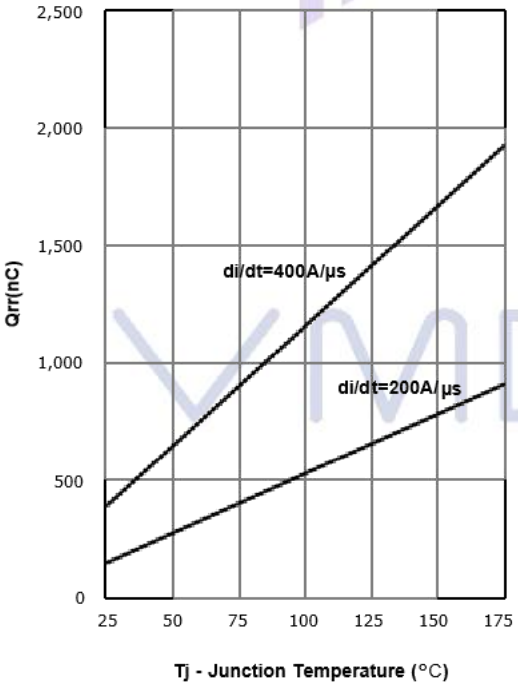


Fig 8: Vcesat Vs Temperature Characteristics

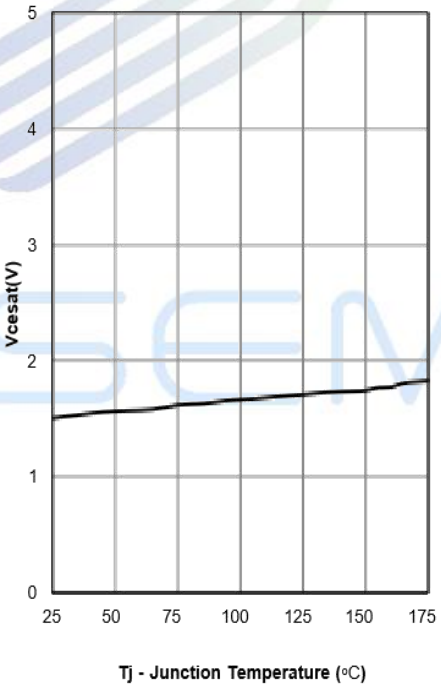
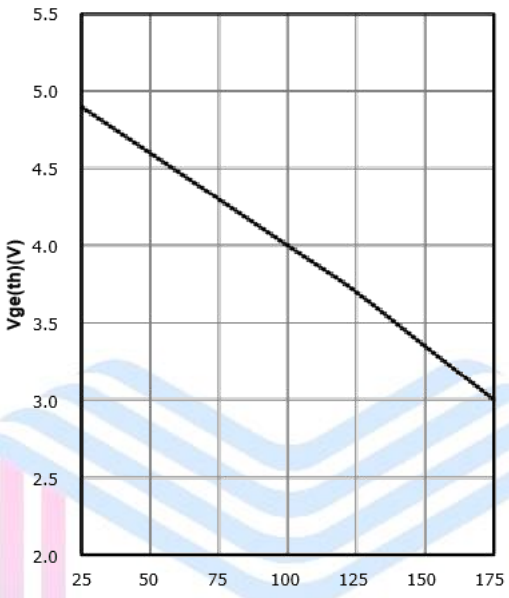
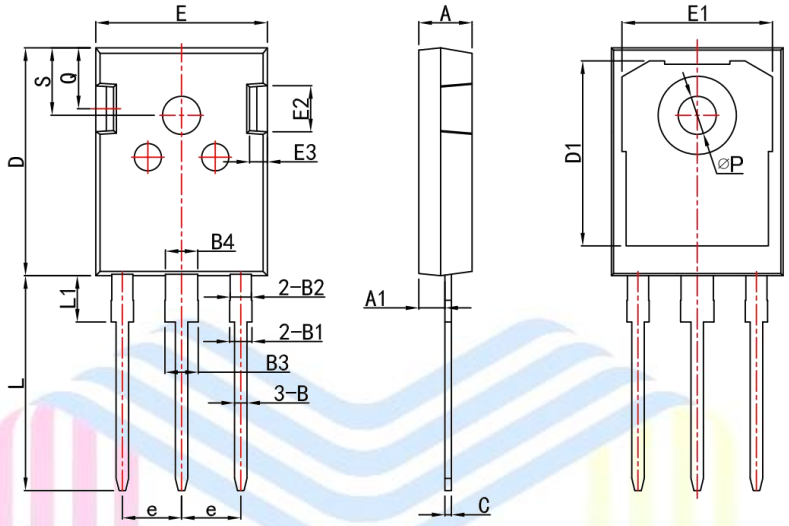


Fig 9: Vge(th)vs. Temperature Characteristics



Mechanical Dimensions

TO-247 Package Information



TOP VIEW SIDE VIEW(Left) BOTTOM VIEW

SYMBOL	MIN	MAX
A	4.60	5.20
A1	2.20	2.60
B	0.90	1.40
B1	1.75	2.35
B2	1.75	2.15
B3	2.80	3.35
B4	2.80	3.15
C	0.50	0.70
D	20.60	21.30
D1	16.00	18.00
E	15.50	16.10
E1	13.00	14.70
E2	3.80	5.30
E3	0.80	2.60
e	5.20	5.70
L	19.00	20.50
L1	3.90	4.60
ΦP	3.30	3.70
Q	5.20	6.00
S	5.80	6.60
All Dimensions in mm		

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