

Description

Using Trench design and advance FS technology, the 650V FS IGBT offers superior and switching performances, high avalanche ruggedness easy parallel operation



Features

- FS Trench Technology, Positive temperature coefficient
- Low saturation voltage: $V_{CE(sat)}(typ.) = 1.50V @ I_C = 80A, T_j = 25^\circ C$
- Extremely enhanced avalanche capability
- Maximum Junction Temperature $175^\circ C$

Product Summary		
$V_{CES}(V)$	$V_{CESAT}(V)Typ$	$I_C(A)$
650	1.5 @ 15V, 80A	80

Mechanical Data

- Case: TO-247 Package

Application

- Uninterrupted Power Supply
- Welding Converters
- Solar Converters
- Mid to High Range Switching Frequency Converters

TO-247
GP80N65FTD



Block Diagram

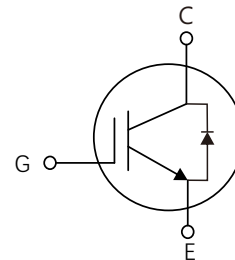


Table1 Absolute Maximum Ratings ($T_c = 25^\circ C$, unless otherwise specified)

Parameters	Symbol	Value	Unit
Collector-Emmitter Voltage	V_{CES}	650	V
Gate-Emmitter Voltage	V_{GES}	± 20	V
Collector Current-continuous	I_C	$T_c = 25^\circ C$	160
		$T_c = 100^\circ C$	80
Collector Current – pulse (Note 1)	I_{CM}	320	A
Power Dissipation	P_D	$T_c = 25^\circ C$	375
		$T_c = 100^\circ C$	187
Operating Junction Temperature	T_j	$-40 \sim +175$	$^\circ C$
Storage Temperature Range	T_{STG}	$-55 \sim +175$	

Table 2. Thermal Characteristics

Parameters	Symbol	Value	Unit
IGBT Thermal resistance Junction to Ambient	$R_{\theta JA}$	32.5	$^{\circ}\text{C}/\text{W}$
IGBT Thermal resistance Junction to Case	$R_{\theta JC}$	0.60	$^{\circ}\text{C}/\text{W}$

Table 3. Electrical Characteristics ($T_J=25^{\circ}\text{C}$, unless otherwise specified)

Parameters	Symbol	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
Collector-Emmitter Voltage	BV_{CES}	$V_{GE}=0\text{V}, I_C=200\mu\text{A}$	650			V
Zero Gate Voltage Collector Current	I_{CES}	$V_{CE}=650\text{V}, V_{GE}=0\text{V}$			40	μA
Gate-body Leakage Current	Forward	$V_{GS}=20\text{V}, V_{DS}=0\text{V}$			100	nA
	Reverse				-100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GE(TH)}$	$V_{CE}=V_{GE}, I_C=800\mu\text{A}$	3.7	4.5	5.3	V
Collector-Emmitter saturation Voltage	V_{CESAT}	$V_{GE}=15\text{V}, I_C=80\text{A}, T_J=25^{\circ}\text{C}$		1.5	2.0	V
Dynamic Characteristics						
Input Capacitance	C_{IES}	$V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$		1968		pF
Output Capacitance	C_{OES}			212		pF
Reverse Transfer Capacitance	C_{RES}			62		pF
Switching Characteristics						
Turn-On Delay Time	$t_{d(on)}$	$V_{CC}=400\text{V}, I_C=80\text{A},$ $V_{GE}=\pm 15\text{V}, R_G=20\Omega,$ Inductive Load, $T_J=25^{\circ}\text{C}$		24		ns
Turn-On Rise Time	t_r			81		ns
Turn-Off Delay Time	$t_{d(off)}$			248		ns
Turn-Off Fall Time	t_f			116		ns
Turn-On energy	E_{on}			0.82		mJ
Turn-Off energy	E_{off}			2.68		mJ
Total switching energy	E_{tot}			2.23		mJ
Total Gate Charge	Q_G	$V_{CC}=520\text{V}, I_C=80\text{A},$ $V_{GE}=15\text{V}$		126		nC
Gate to emitter charge	Q_{GE}			19.8		nC
Gate to collector charge	Q_{GC}			72		nC
Diode Characteristics						
Diode Forward Voltage	V_F	$I_F=80\text{A}, T_J=25^{\circ}\text{C}$		1.8	2.2	V
Reverse Recovery Time	T_{rr}	$I_F=80\text{A}, V_R=400\text{V}$ $di/dt=350\text{A}/\mu\text{S}$		233.8		ns
Diode Peak Reverse Recovery Current	I_{rrm}			12.7		A
Reverse Recovery Charge	Q_{rr}			627		nC

Notes: 1 Repetitive Rating; Pulse width limited by maximum junction temperature

Typical Characteristics Diagrams

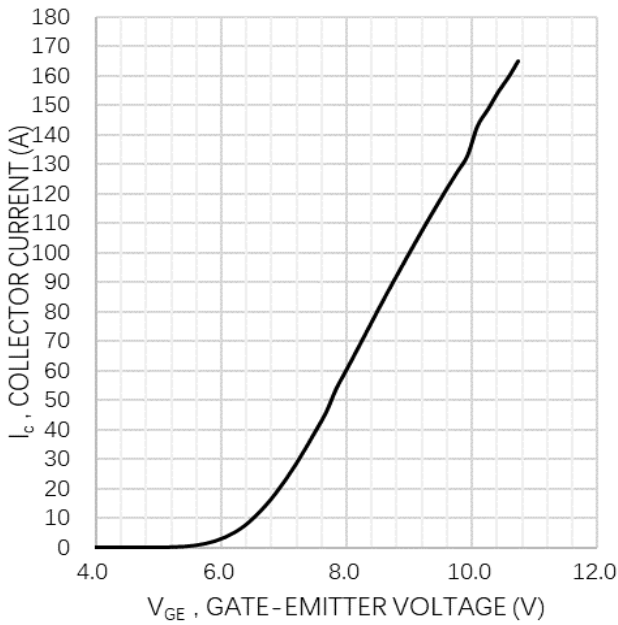


Fig. 1 Typical transfer characteristics
(V_{CE}=20V)

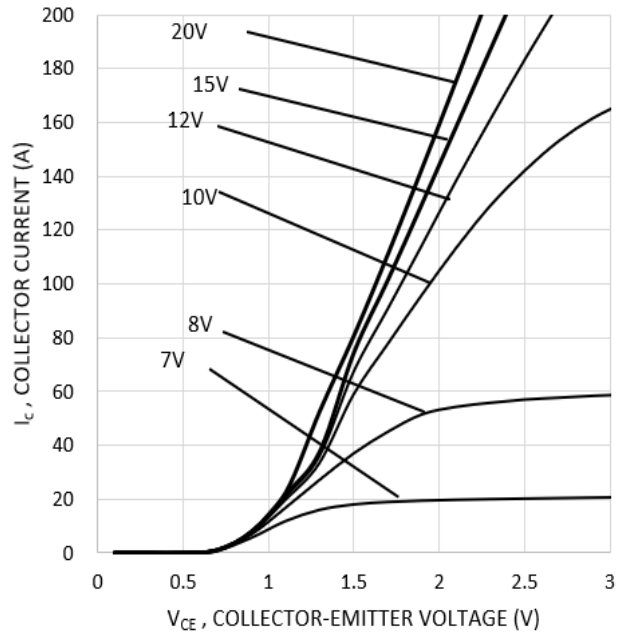


Fig. 2 Typical output characteristic (T_{vj}=25°C)

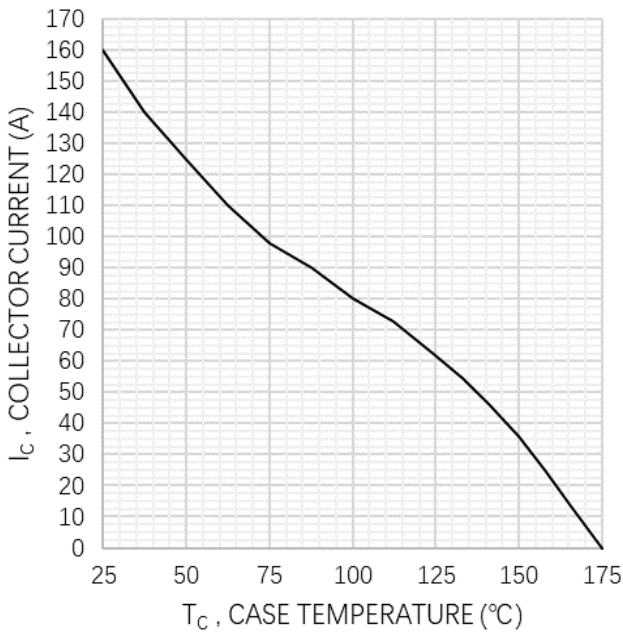


Fig. 3 Collector current as a function of case temperature (V_{GE}≥15V, T_{vj}≤175°C)

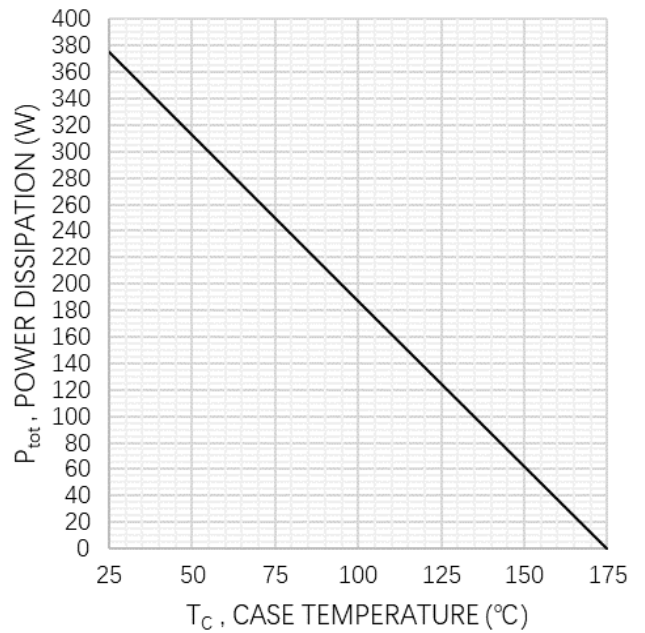


Fig. 4 Power dissipation as a function of case temperature (T_{vj}≤175°C)

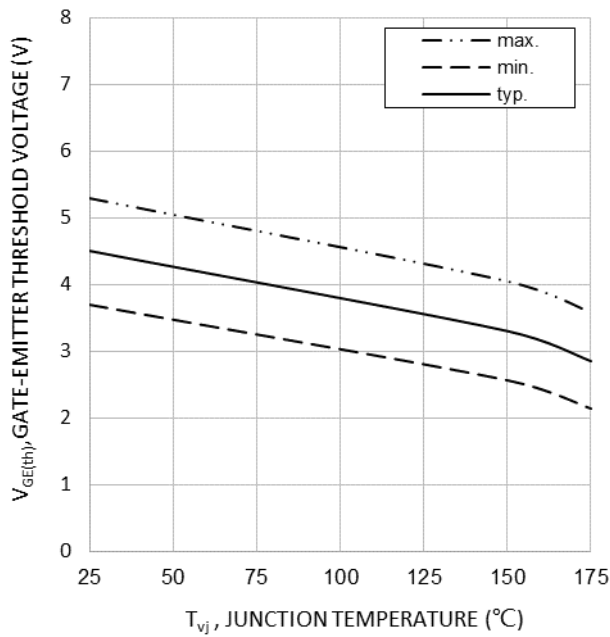


Fig. 5 Gate-emitter threshold voltage as a function of junction temperature ($I_c=0.60\text{mA}$)

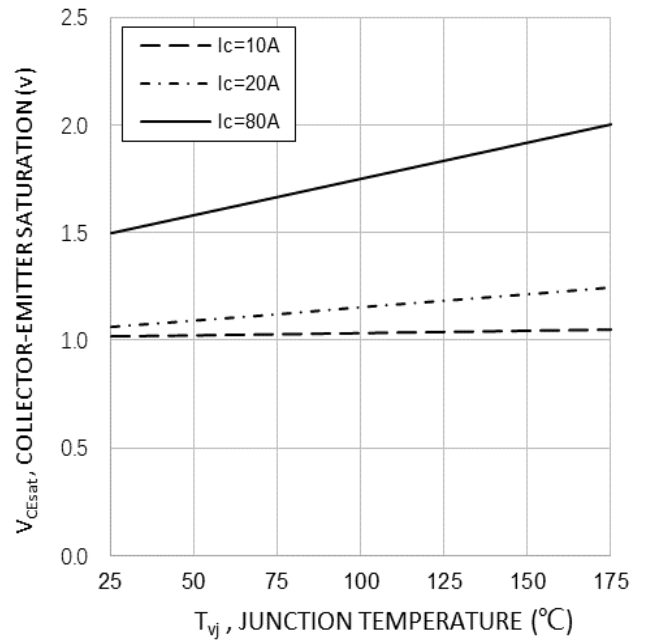


Fig. 6 Typical collector-emitter saturation voltage as a function of junction temperature ($V_{GE}=15\text{V}$)

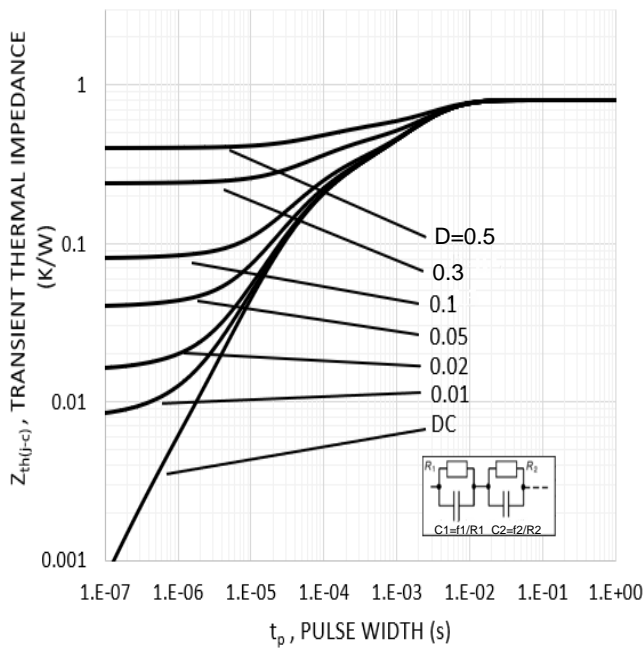


Fig. 7 IGBT transient thermal impedance ($D=t_p/T$)

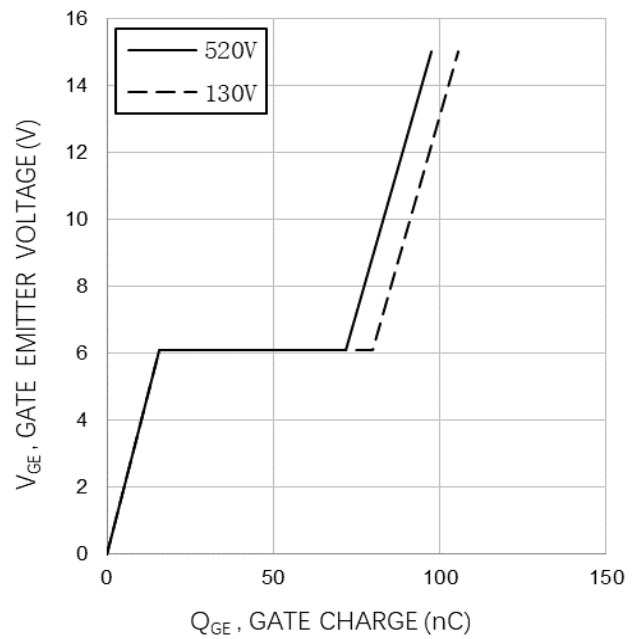


Fig. 8 Typical gate charge

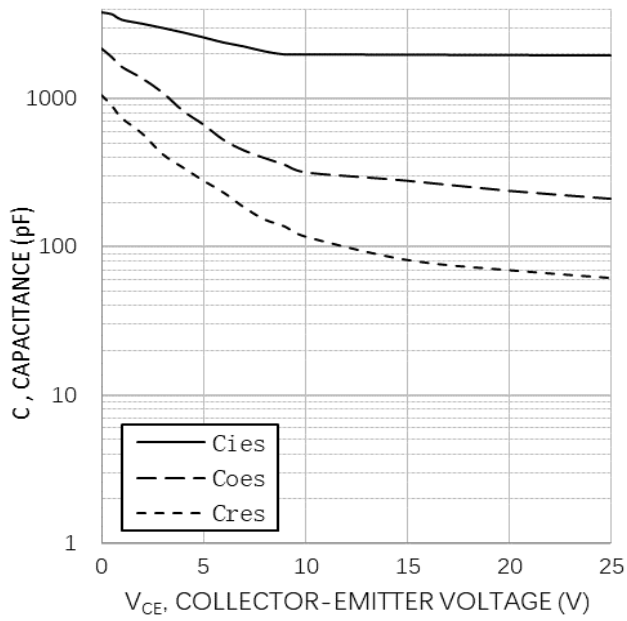
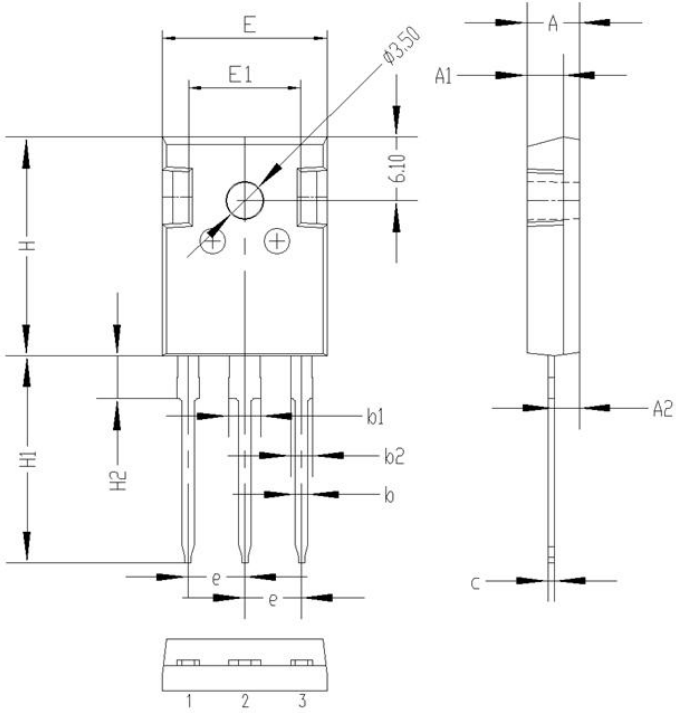


Fig. 9 Typical capacitance as a function of collector-emitter voltage ($V_{GE}=0V$, $f=1MHz$)

Dimensions

TO-247 PACKAGE OUTLINE DIMENSIONS

TO-247 PACKAGE



Symbol	Dimensions (millimeters)	
	Min.	Max.
A	4.80	5.20
A1	3.30	3.70
A2	2.10	2.50
b	1.00	1.40
b1	2.90	3.30
b2	1.90	2.30
c	0.40	0.80
e	5.25	5.65
E	15.6	16.0
E1	10.6	11.6
H	20.8	21.2
H1	19.4	20.4
H2	3.90	4.30
G	5.90	6.30
ΦP	3.30	3.70

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