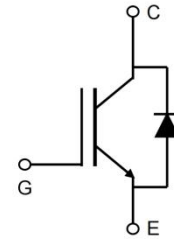
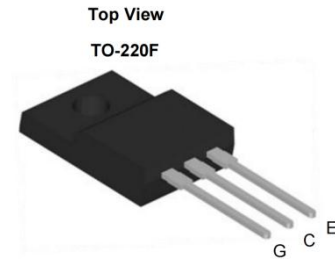




Product Summary

V_{CE}	$V_{CE(sat) Max}$	$I_C T_C=100^{\circ}C$
600V	2V	15A

Package & Internal Circuit



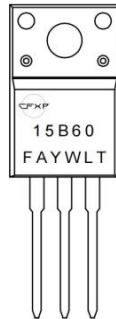
Description and Applications

- Trench Field Stop technology
- Low $V_{CE(SAT)}$
- Fast Switching Characteristics
- Low Turnoff Voltage Spike
- Ultrafast Recovery Diode embedded
- Low Forward Voltage
- Low Leakage Current
- Frequency Conversion Appliances
- General Purpose Frequency Conversion

Ordering Information

Part Number	Package Type	Package Qty
CFTF15B60	TO-220F	1,000/Tube

Marking Information



Green product

CFXP--Logo

15B60--Part Number

F-Fab location

A-Assembly location

Y--Year

W--Week

LT--Lot sequence

Absolute Maximum Rating ($T_{amb}=25^{\circ}C$ unless otherwise noted)

Parameter		Symbol	Value	Units
Collector-emitter voltage		V_{CE}	600	V
Gate-emitter voltage		V_{GE}	± 30	V
Collector current (continuous)	$T_C=25^{\circ}C$	I_C	30	A
	$T_C=100^{\circ}C$		15	A
Pulsed Collector Currentt, Limited by T_{Jmax}		I_{CM}	60	A
Turn off SOA, $V_{CE} \leq 650Vt$, Limited by T_{Jmax}		I_{LM}	60	A
Diode RMS forward current	$T_C=25^{\circ}C$	I_F	30	A
	$T_C=100^{\circ}C$		15	A

Surge not repetitive forward current tp = 10 ms sinusoidal		IFM	60	A
Short Circuit Withstanding Time RG=50Ω, VGE=15V, VCC≤400V, TJ=25°C		tsc	8	us
Power Dissipation	TC=25°C	PD	42	W
	TC=100°C		20	W
Operating and Storage Temperature Range		TJ, TSTG	-55 to 150	°C

Thermal Characteristics

Parameter	Symbol	Max	Units
Maximum Junction-to-Ambient	$R_{\theta JA}$	65	$^\circ C/W$
Maximum IGBT Junction-to-Case	$R_{\theta JC}$	3	$^\circ C/W$
Maximum Diode Junction-to-Case	$R_{\theta JC}$	4	$^\circ C/W$

Electrical Characteristics ($T_a=25^\circ C$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Static Parameters						
BV_{CES}	Collector-Emitter Breakdown Voltage	$I_C=1mA, V_{GE}=0V$	600			V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=15A, V_{GE}=15V$		1.55	2	V
V_F	Diode Forward Voltage	$V_{GE}=0, I_C=1A$		0.9	1	V
		$V_{GE}=0, I_C=6A$		1.15	1.5	V
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$V_{CE}=5V, I_C=250\mu A$	4.5	5.4	6.5	V
I_{CES}	Collector cut-off current	$V_{CE}=600V, V_{GE}=0V$			10	μA
		$T_C=100^\circ C$			300	μA
I_{GES}	Gate-emitter leakage current	$V_{CE}=0V$ $V_{GE}=\pm 20V$			± 100	nA
g_{FS}	Forward transconductance	$V_{CE}=20V, I_C=15A$		6		S
Dynamic Parameters						
C_{ies}	Input Capacitance	$V_{GE}=0V$ $V_{CE}=25V$ $f=1MHz$		655		pF
C_{oes}	Output Capacitance			88		pF
C_{res}	Reverse Transfer Capacitance			17		pF
Q_g	Total Gate Charge	$V_{GE}=15V$ $V_{CE}=150V$ $I_C=1.5A$		19.4		nC
Q_{gs}	Gate Source Charge			3.77		nC
Q_{gd}	Gate Drain Charge			9.51		nC
$I_{C(sc)}$	Short circuit collector current	$V_{GE}=15V$ $V_{CE}=400V$ $R_G=50\Omega$		97		A
R_g	Gate resistance	$V_{GE}=0V, V_{CC}=0V$ $f=1MHz$		1	2	Ω

Switching Parameters, (Load Inductive, T _J =25°C)						
t _{D(on)}	Turn-On DelayTime	V _{GE} =15V V _{CE} =400V I _C =15A L=1mH R _{GEN} =15Ω		42.4		ns
t _r	Turn-On Rise Time			17.4		ns
t _{D(off)}	Turn-Off DelayTime			116.6		ns
t _f	Turn-Off Fall Time			77.1		ns
E _{on}	Turn-On Energy			0.28		mJ
E _{off}	Turn-Off Energy			0.36		mJ
E _{total}	Total Switching Energy			0.64		mJ
t _{rr}	Diode Reverse Recovery Time	I _F = 15 A di/dt = 575 A/μs V _{CE} = 400V		31.1		ns
Q _{rr}	Diode Reverse Recovery Charge			90		nC
I _{rm}	Diode Peak Reverse Recovery Current			5.59		A

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

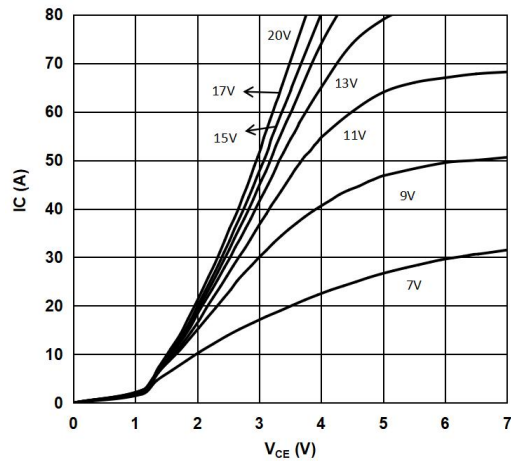


Figure 1: Output Characteristic

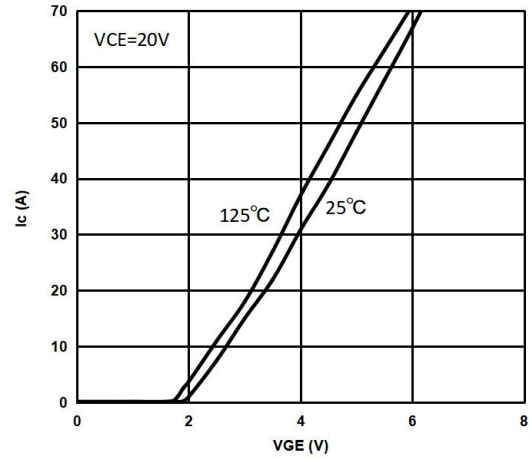


Figure 2: Transfer Characteristic

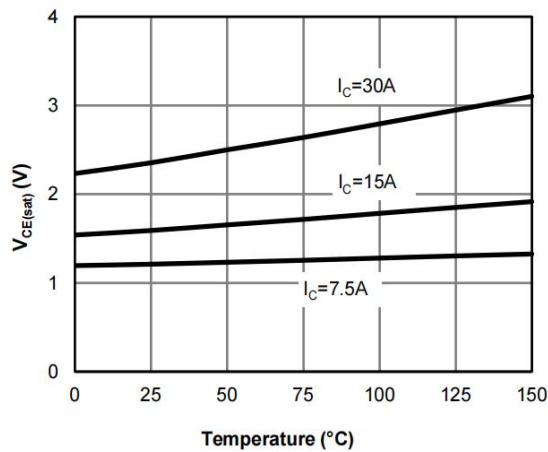


Figure 3: Collector-Emitter Saturation Voltage vs. Junction Temperature

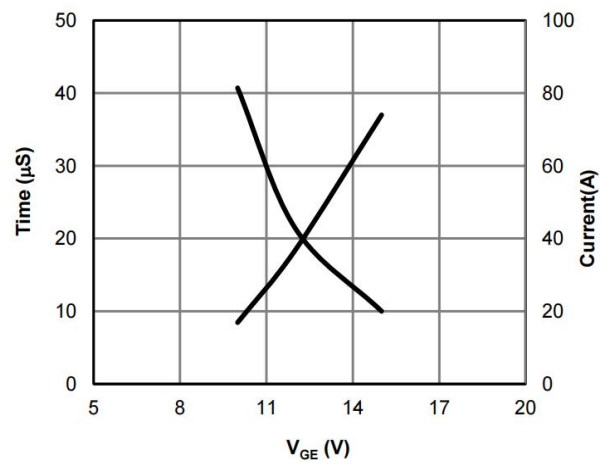


Figure 4: VGE vs. Short Circuit Time (VCE=400V, TC=25°C)

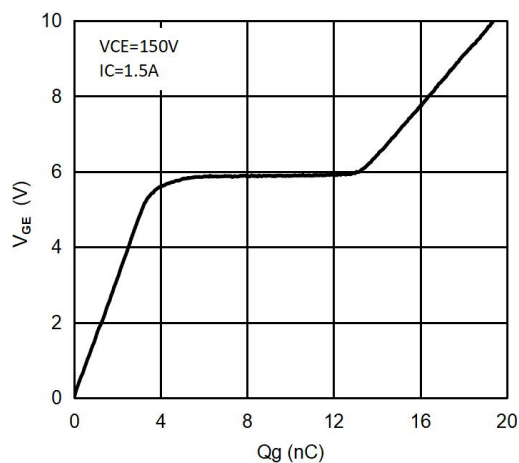


Figure 5: Gate-Charge Characteristics

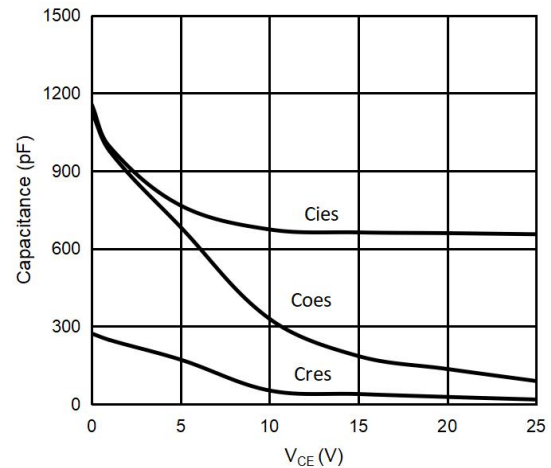


Figure 6: Capacitance Characteristic

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

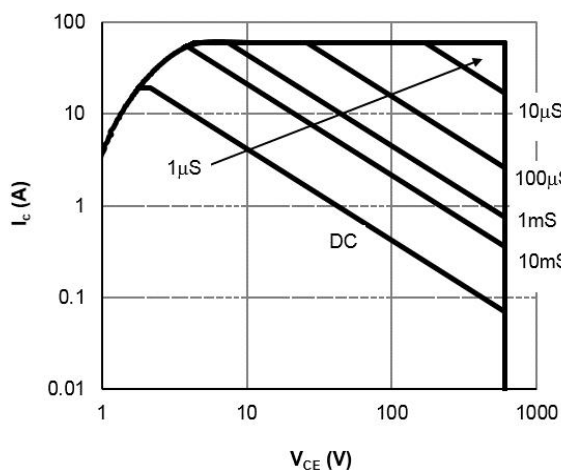


Figure 7: Forward Bias Safe Operating Area($T_c=25^\circ\text{C}$, $V_{GE}=15\text{V}$)

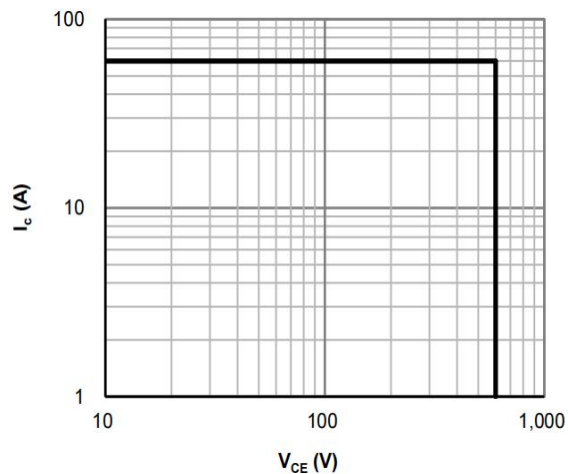


Figure 8: Reverse Bias SOA ($T_j=150^\circ\text{C}$, $V_{GE}=15\text{V}$)

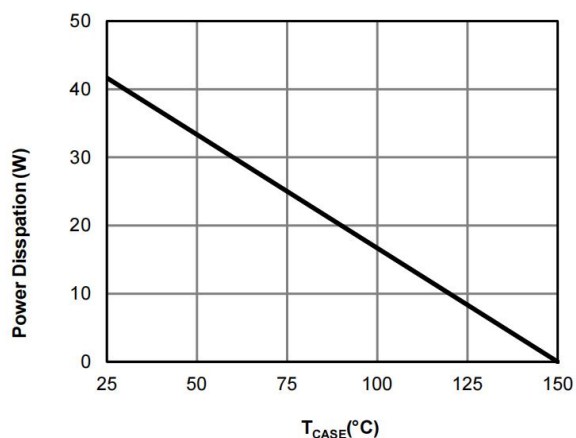


Figure 9: Power Dissipation as a Function of Case

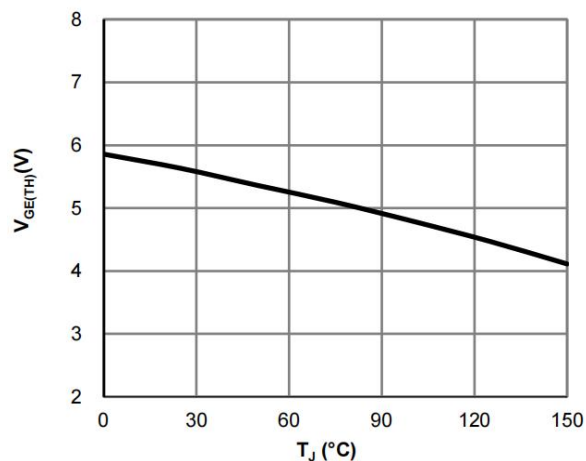


Figure 10: $V_{GE(TH)}$ vs. T_j

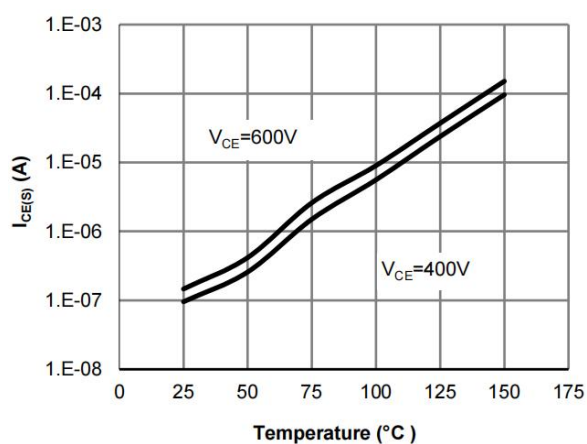


Figure 11: Diode Reverse Leakage Current vs. Junction Temperature

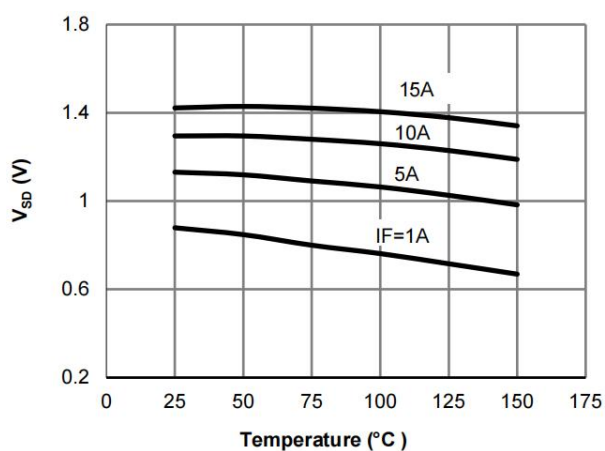


Figure 12: Diode Forward voltage vs. Junction Temperature

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

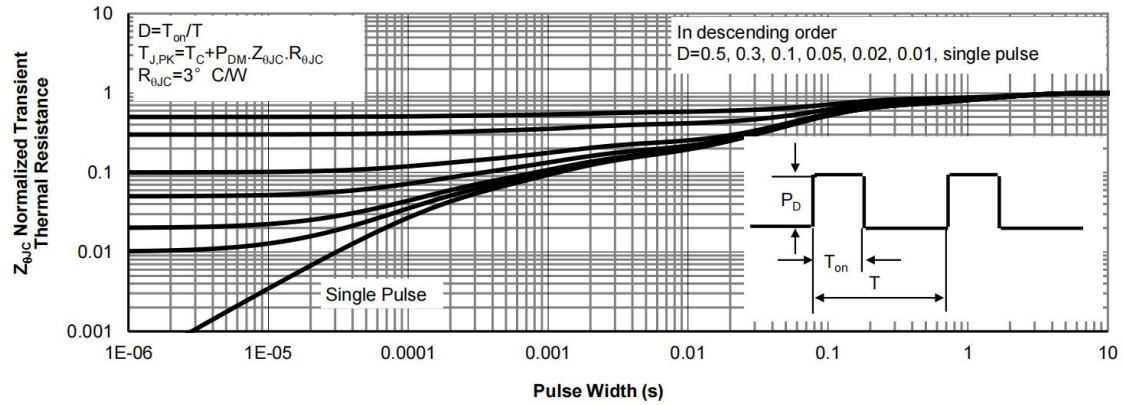


Figure 13: Normalized Maximum Transient Thermal Impedance for IGBT

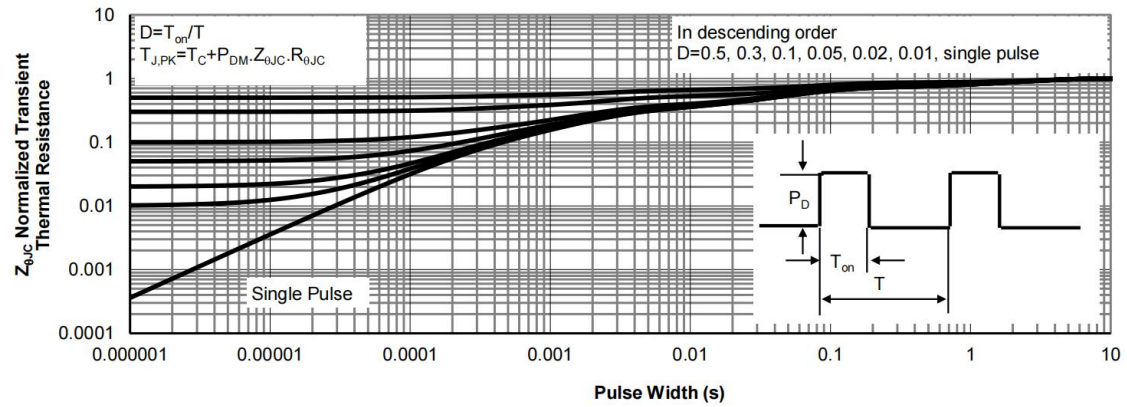
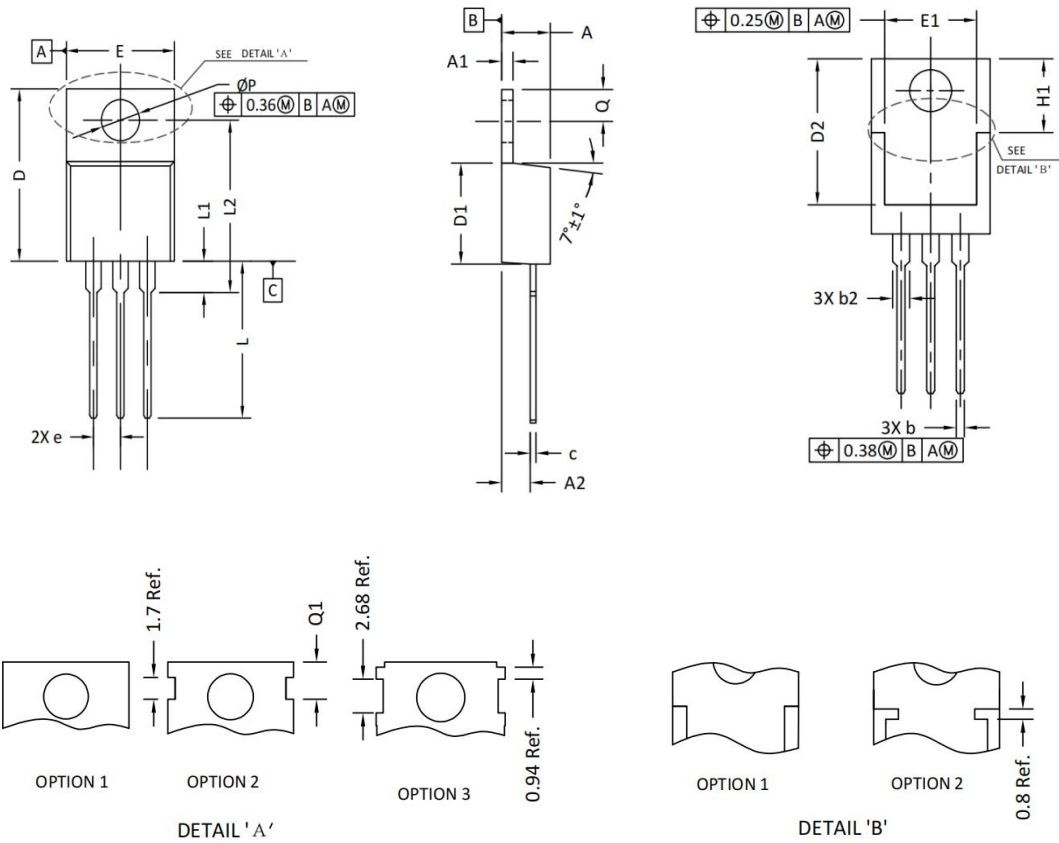


Figure 14: Normalized Maximum Transient Thermal Impedance for Diode

TO-220F Package



SYMBOLS	DIM. IN MM			DIM. IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	4.300	4.450	4.720	0.169	0.175	0.186
A1	1.150	1.270	1.400	0.045	0.050	0.055
A2	2.200	2.670	2.900	0.087	0.105	0.114
b	0.690	0.810	0.950	0.027	0.032	0.037
b2	1.170	1.370	1.450	0.046	0.054	0.057
c	0.360	0.380	0.600	0.014	0.015	0.024
D	14.500	15.440	15.800	0.571	0.608	0.622
D1	8.590	9.140	9.650	0.338	0.360	0.380
D2	11.430	11.730	12.480	0.450	0.462	0.491
e	2.54BSC			0.1BSC		
E	9.660	10.030	10.540	0.380	0.395	0.415
E1	6.220	-----	-----	0.245	-----	-----
H1	6.100	6.300	6.500	0.240	0.248	0.256
L	12.270	12.820	14.270	0.483	0.505	0.562
L1	2.470	-----	3.900	0.097	-----	0.154
L2	-----	-----	16.700	-----	-----	0.657
Q	2.590	2.740	2.890	0.102	0.108	0.114
ϕP	3.500	3.840	3.890	0.138	0.151	0.153
Q1	2.700	-----	2.900	0.106	-----	0.114

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