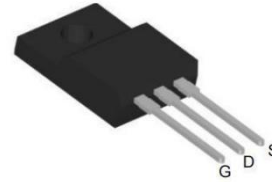


Product Summary

V_{DS}	$R_{DS(ON)}$ typ	I_D ($T_c=25^\circ C$)
650V	<120m Ω @ $V_{GS}=18V$	18.5A

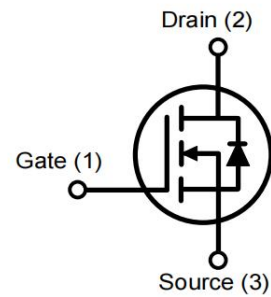
Package & Internal Circuit

TO-220F-3L



Description and Applications

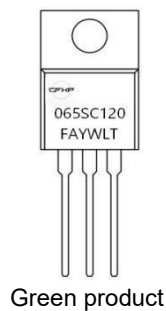
- Low On-Resistance with High Blocking Voltage
- Low Capacitance
- Avalanche Ruggedness
- Halogen Free, RoHS Compliant
- High Frequency Operation
- Enabling Higher Switching Frequency
- Increased Power Density
- Reduction of Heat Sink Requirements
- Switch Mode Power Supplies (SMPS)
- Power Inverter & Solar Inverter
- Motor Drivers & EV Charging Station
- DC/DC Converter



Ordering Information

Part Number	Package Type	Package Qty
CFTF065SC120	TO-220F-3L	1000/Tube

Marking Information



Green product

CFXP--Logo
065SC120-Part Number
F-Fab location
A-Assembly location
Y--Year
W--Week
LT--Lot sequence

Thermal Characteristics

Parameter	Symbol	Value	Units
Thermal Resistance from Junction to Case	$R_{th(jc)}$	2.9	K/W

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

Parameter		Symbol	Value	Units
Drain-Source Voltage		V_{DSmax}	650	V
Gate-Source Voltage		V_{GSmax}	-8/20	V
Recommended Gate-Source Voltage		V_{GSOP}	-4/18	V
Drain Current - Continuous	$V_{GS}=15\text{V}, T_C=25^{\circ}\text{C}$	I_D	18.5	A
	$V_{GS}=16.5\text{V}, T_C=25^{\circ}\text{C}$		19	A
	$V_{GS}=18\text{V}, T_C=25^{\circ}\text{C}$		19.5	A
	$V_{GS}=18\text{V}, T_C=100^{\circ}\text{C}$		13.8	A
Pulsed Drain Current		$I_{D,pulse}$	53	A
Power Dissipation	$T_C=25^{\circ}\text{C}, T_J=175^{\circ}\text{C}$	P_{tot}	52	W
Operating Junction Temperature		T_J	$\sim 55\sim 175$	$^{\circ}\text{C}$
Storage Temperature		T_{stg}	$\sim 55\sim 175$	$^{\circ}\text{C}$

Electrical Characteristics ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$I_D=100\mu\text{A}, V_{GS}=0\text{V}$	650			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=650\text{V}, V_{GS}=0\text{V}$		2	100	μA
		$T_J=175^{\circ}\text{C}$		10		μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}, V_{GS}=18\text{V}$			100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=1\text{mA}$	2.0	2.7	4.0	V
		$T_J=175^{\circ}\text{C}$		1.9		V
$R_{DS(ON)}$	Drain-Source on-Resistance	$V_{GS}=15\text{V}, I_D=6\text{A}$		160	180	m Ω
		$V_{GS}=16.5\text{V}, I_D=6\text{A}$		135		m Ω
		$V_{GS}=18\text{V}, I_D=6\text{A}$		120	130	m Ω
		$T_J=175^{\circ}\text{C}$		135		m Ω
g_{fs}	Forward Transconductance	$V_{DS}=10\text{V}, I_D=6\text{A}$		3.6		S
AC Characteristics						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}$ $V_{DS}=500\text{V}$ $f=100\text{kHz}$ $V_{AC}=25\text{mV}$		415		pF
C_{oss}	Output Capacitance			29		pF
C_{rss}	Reverse Transfer Capacitance			2		pF
E_{oss}	C_{OSS} Stored Energy			4.4		μJ
$C_{O(ER)}$	Effective Output Capacitance Energy Related	$V_{GS}=0\text{V}, 0\text{V}<V_{DS}<500\text{V}$		35		pF
$C_{O(TR)}$	Effective Output Capacitance Time Related	$V_{GS}=0\text{V}, 0\text{V}<V_{DS}<500\text{V}$		52		pF
$R_{G(int)}$	Internal Gate Resistance	$f=1\text{MHz}, V_{AC}=25\text{mV}$		32		Ω

Gate Charge Characteristics

Q_{gs}	Gate Source Charge	$V_{GS}=-4/+18V$ $V_{DS}=500V$ $I_D=6A$		5		nC
Q_{gd}	Gate Drain Charge			9		nC
Q_g	Total Gate Charge			17		nC

Switching Characteristics

$t_{D(on)}$	Turn-On Delay Time	$V_{DC}=500V$ $V_{GS}=-4/18V$ $I_D=6A$ $R_{G(ext)}=2.2\Omega$ $L=50nH$ $T_j=25^\circ C$		18		ns
t_r	Rise Time			11		ns
$t_{D(off)}$	Turn-Off Delay Time			36		ns
t_f	Fall Time			14		ns
E_{on}	Turn-On Switching Energy			58		μJ
E_{off}	Turn-Off Switching Energy			12		μJ
$t_{D(on)}$	Turn-On Delay Time	$V_{DC}=500V$ $V_{GS}=-4/18V$ $I_D=6A$ $R_{G(ext)}=2.2\Omega$ $L=50nH$ $T_j=175^\circ C$		17		ns
t_r	Rise Time			11		ns
$t_{D(off)}$	Turn-Off Delay Time			43		ns
t_f	Fall Time			13		ns
E_{on}	Turn-On Switching Energy			67		μJ
E_{off}	Turn-Off Switching Energy			11		μJ

Reverse Diode Characteristics

V_{SD}	Body Diode Forward Voltage	$I_{SD}=3A, V_{GS}=-4V$		4.3		V
		$T_j=175^\circ C$		3.7		V
I_{SD}	Continuous Diode Forward Current	$V_{GS}=-4V, T_c=25^\circ C$		9		A
$I_{SD,pulse}$	Pulsed Diode Current	$V_{GS}=-4V$		36		A
t_{rr}	Reverse Recover Time	$V_{GS}=-4V$ $V_{DC}=500V$ $I_{SD}=6A$ $-di_F/dt=850A/\mu s$ $T_j=25^\circ C$		19		ns
Q_{rr}	Reverse Recovery Charge			39		nC
I_{rrm}	Peak Reverse Recovery Current			3.5		A
t_{rr}	Reverse Recover Time	$V_{GS}=-4V$ $V_{DC}=500V$ $I_{SD}=6A$ $-di_F/dt=850A/\mu s$ $T_j=175^\circ C$		17		ns
Q_{rr}	Reverse Recovery Charge			62		nC
I_{rrm}	Peak Reverse Recovery Current			5.3		A

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

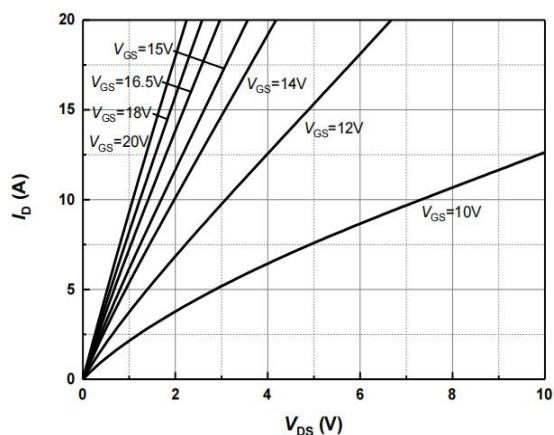


Figure 1: Typical Forward Output Characteristics at $T_j=25^{\circ}\text{C}$

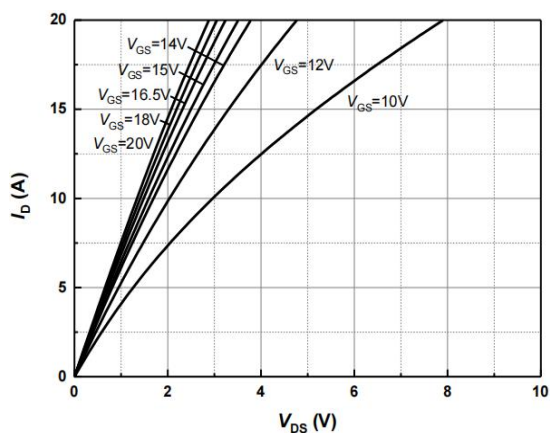


Figure 2: Typical Forward Output Characteristics at $T_j=175^{\circ}\text{C}$

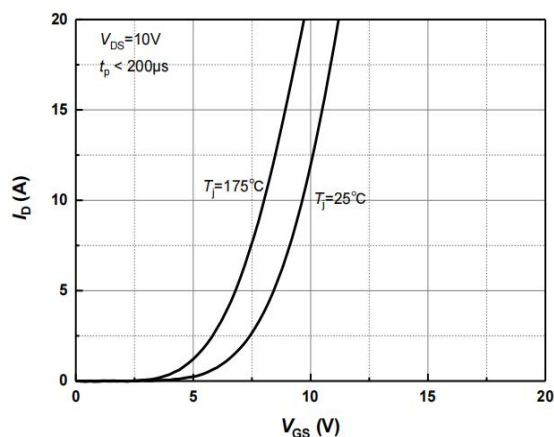


Figure 3: Transfer Characteristics for Various Temperature

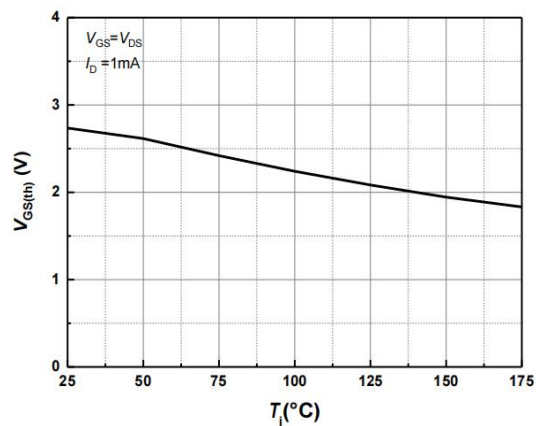


Figure 4: Threshold Voltage for Various Temperature

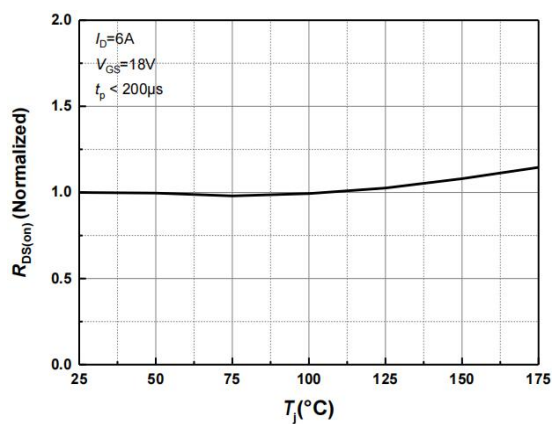


Figure 5: Normalized On-Resistance for Various Temperature

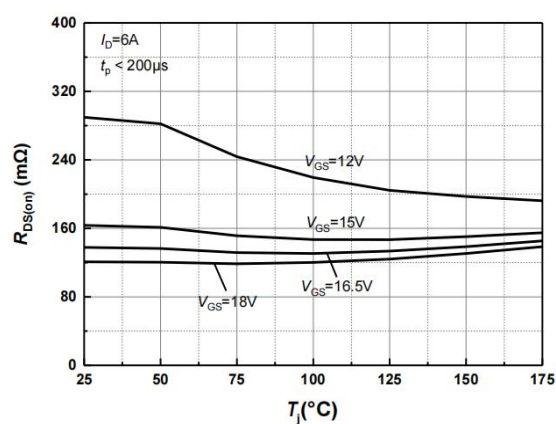


Figure 6: On-Resistance vs. Temperature for Various Gate-Source Voltage

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

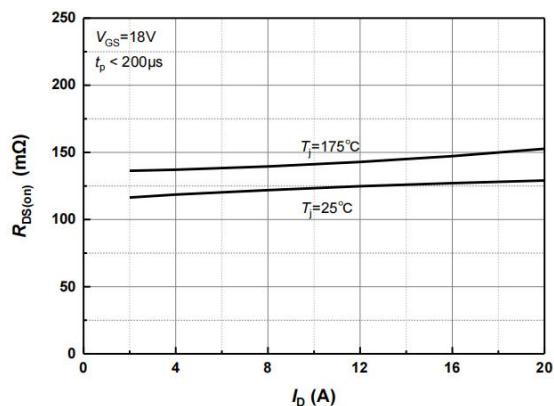


Figure 7: On-Resistance vs. Drain Current for Various Temperature

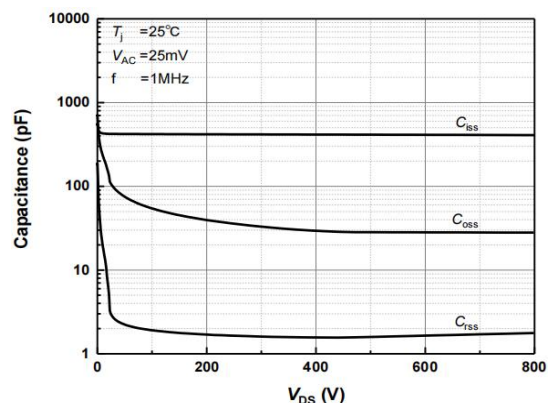


Figure8:Capacitance vs. Drain-Source Voltage (0 - 650V)

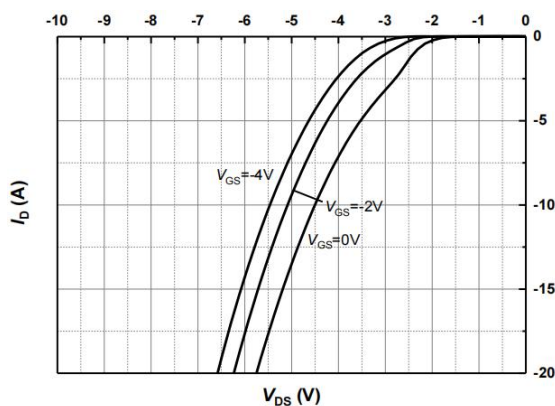


Figure 9: Body Diode Characteristics at $T_J=25^{\circ}\text{C}$

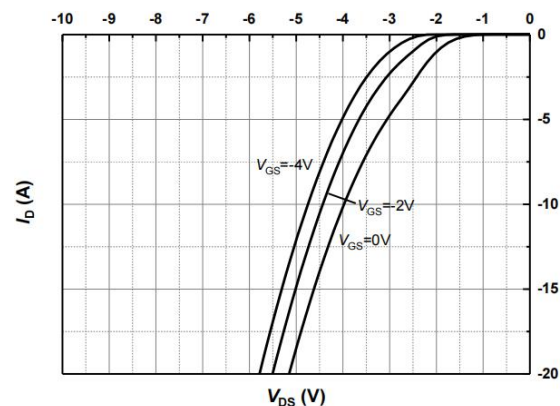


Figure 10: Body Diode Characteristics at $T_J=175^{\circ}\text{C}$

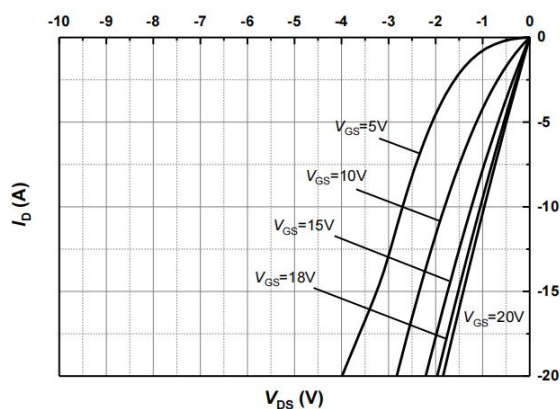


Figure 11: 3rd Quadrant Characteristics at $T_J=25^{\circ}\text{C}$

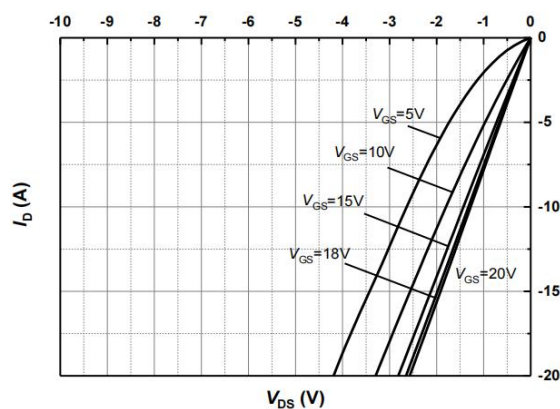


Figure 12: 3rd Quadrant Characteristics at $T_J=175^{\circ}\text{C}$

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

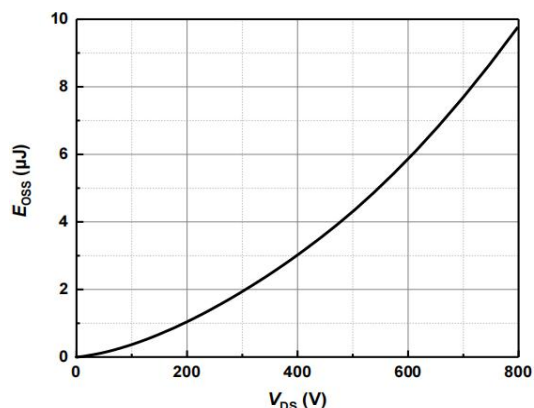


Figure 13: Output Capacitor stored Energy

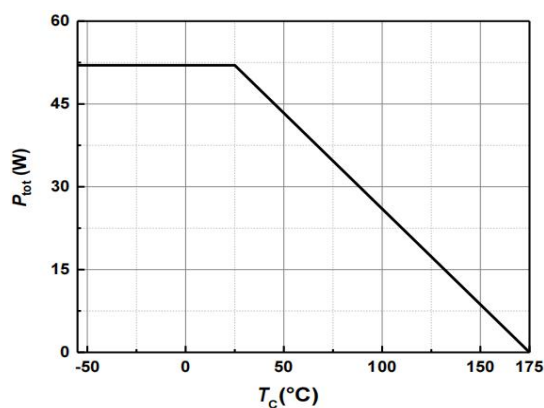


Figure 14: Maximum Power Dissipation Derating vs. Case Temperature

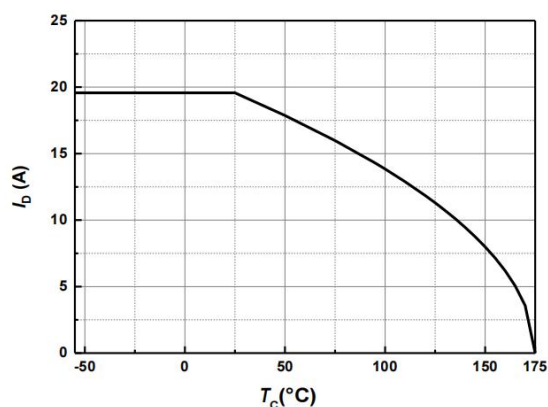


Figure 15: Continuous Drain Current Derating vs. Case Temperature

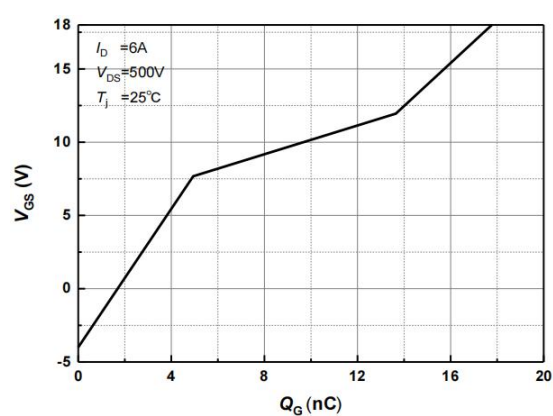


Figure 16: Gate Charge Characteristics

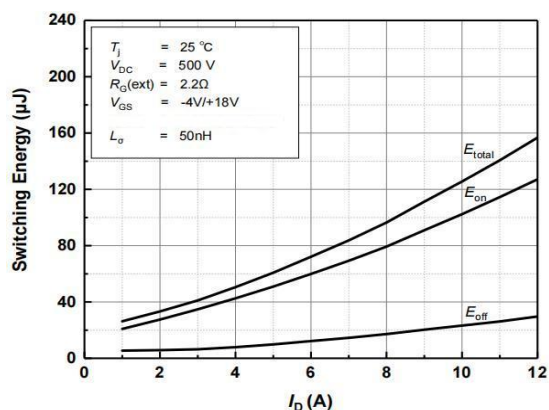


Figure 17: Clamped Inductive Switching Energy vs. Drain Current ($V_{DC}=500V$) at $T_J=25^{\circ}C$

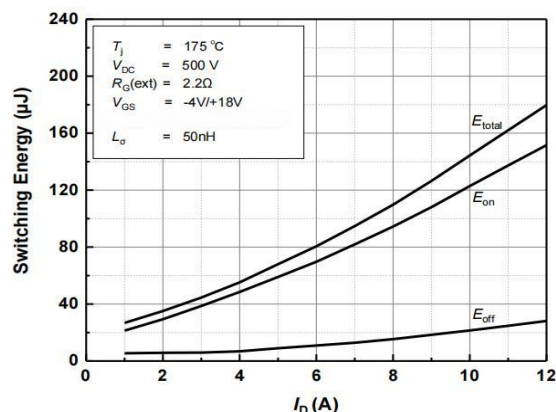


Figure 18: Clamped Inductive Switching Energy vs. Drain Current ($V_{DC}=500V$) at $T_J=175^{\circ}C$

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

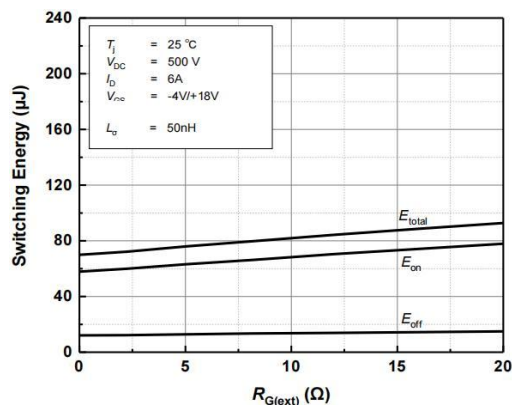


Figure 19: Clamped Inductive Switching Energy vs. External Gate Resistance at $T_j=25^{\circ}\text{C}$

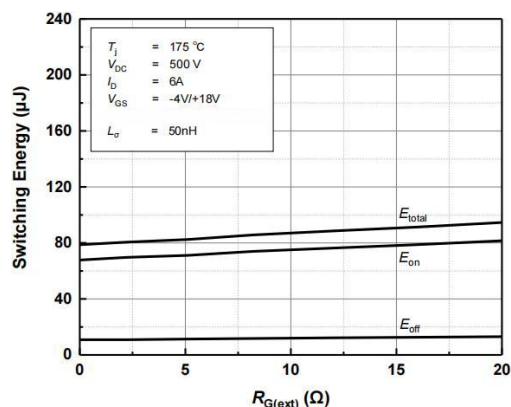


Figure 20: Clamped Inductive Switching Energy vs. External Gate Resistance at $T_j=175^{\circ}\text{C}$

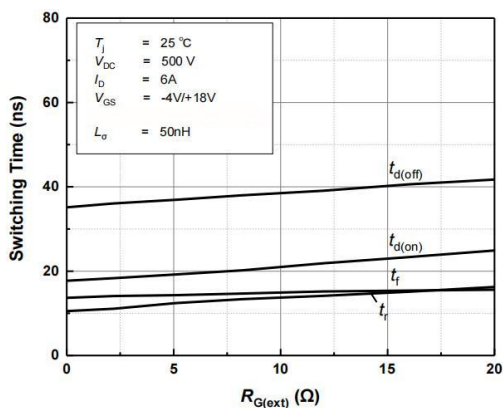


Figure 21: Clamped Inductive Switching Time vs. External Gate Resistance at $T_j=25^{\circ}\text{C}$

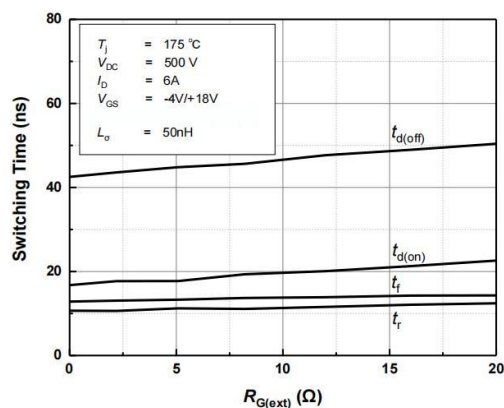


Figure 22: Clamped Inductive Switching Time vs. External Gate Resistance at $T_j=175^{\circ}\text{C}$

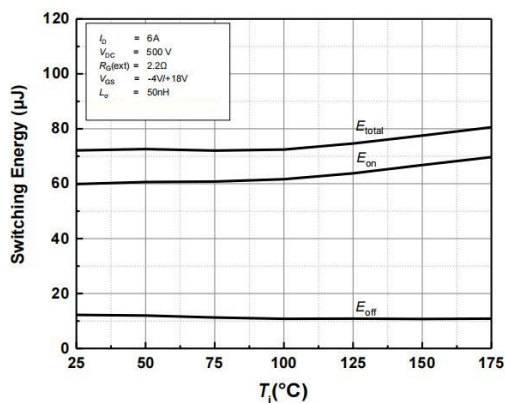


Figure 23: Clamped Inductive Switching Energy vs. Temperature

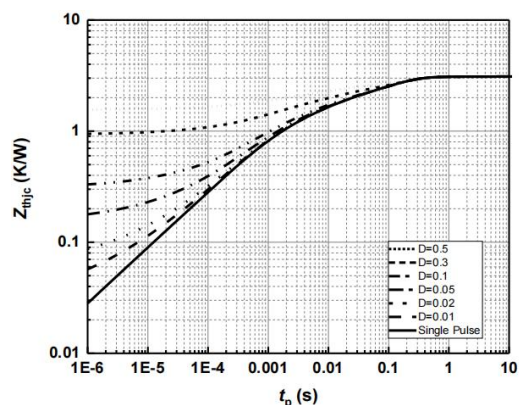


Figure 24: Transient Thermal Impedance (Junction - Case)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

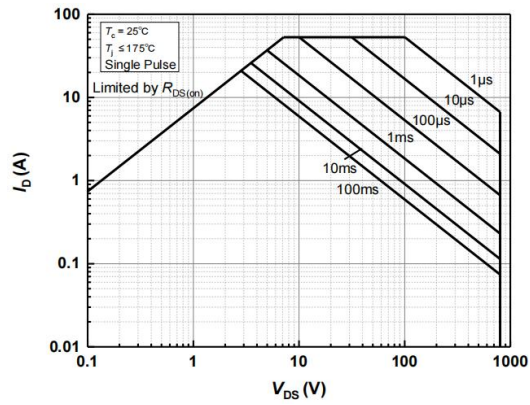
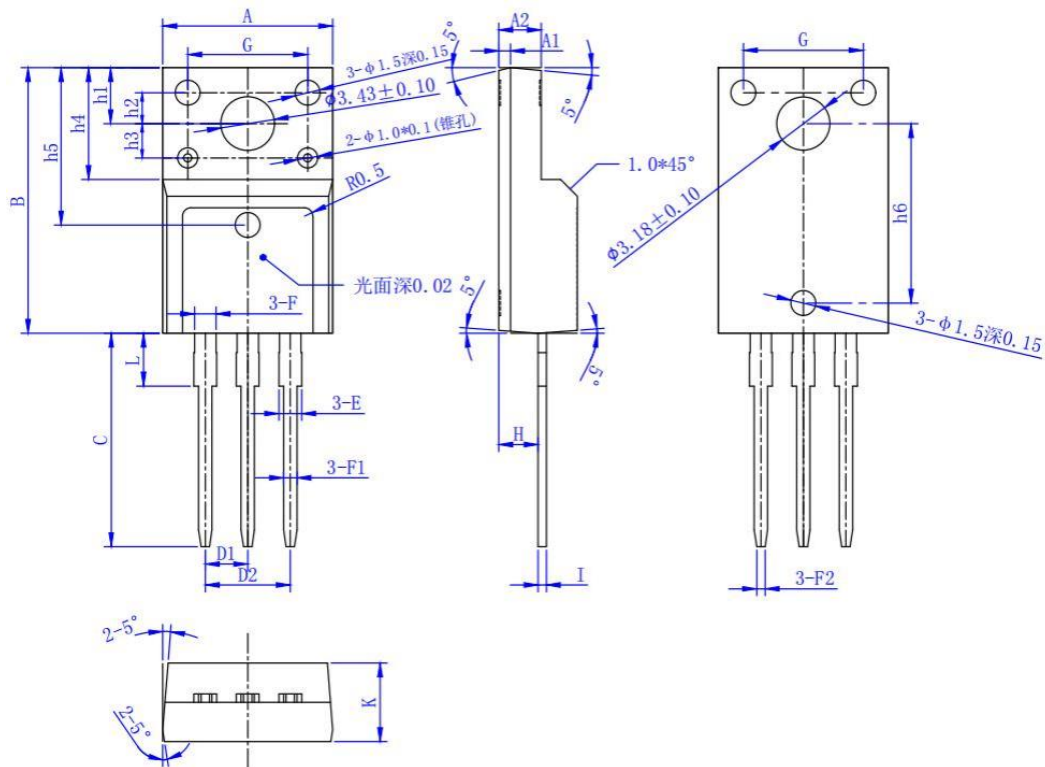


Figure 25: Forward Biased Safe Operating Area

TO-220F-3L Package



SYMBOL	MM		
	MIN	NOM	MAX
*A	10.00	10.20	10.40
A1		0.70	
*A2	2.35	2.55	2.75
*B	15.80	15.90	16.00
*C	13.00	13.25	13.50
*D1		2.54BSC	
*D2		5.08BSC	
*E	1.27	1.32	1.40
F	1.25	1.28	1.30
*F1	0.75	0.80	0.85
F2	0.35	0.40	0.50
G	6.90	7.00	7.10
*H	2.66	2.76	2.86
h1	3.20	3.30	3.40
h2	1.70	1.80	1.90
h3	2.00	2.10	2.20
h4	6.70	6.79	6.90
h5	9.30	9.41	9.50
h6	10.44	10.54	10.64
*I	0.40	0.50	0.60
*K	4.60	4.70	4.80
L	2.90	3.00	3.10
带*为检验尺寸, C之尺寸参考原则必须满足有“尖脚”			

Important Notice

This document contains information that is proprietary to CF-xpower Semiconductor Corp. (“CF-xpower”), and is subject to change without notice. Any part of this document may not be used, reproduced, duplicated or disclosed in any form or any means without the prior written permission of CF-xpower.

CF-xpower does not warrant or represent that any license, either express or implied, is granted under any CF-xpower’s patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which CF-xpower’s products or services are used. In addition, CF-xpower does not assume any liability for the occurrence of infringing on any patent or other intellectual property rights of a third party.

CF-xpower reserves the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete.