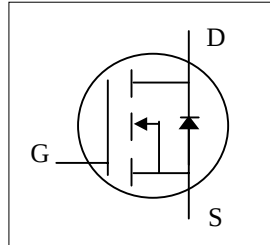


- ▼ 100% R_g & UIS Test
- ▼ Low t_{rr} / Q_{rr}
- ▼ Simple Drive Requirement
- ▼ RoHS Compliant & Halogen-Free

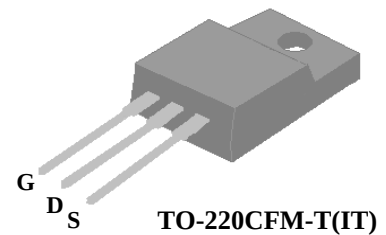


BV_{DSS}	650V
$R_{DS(ON)}$	$0.19\ \Omega$
$I_D^{3,4}$	20A

Description

XP65SC190D series are innovated design and silicon process technology to achieve the lowest possible on-resistance and fast switching performance. It provides the designer with an extreme efficient device for use in a wide range of power applications.

The TO-220CFM package is widely preferred for all commercial-industrial through hole applications. The mold compound provides a high isolation voltage capability and low thermal resistance between the tab and the external heat-sink.



Absolute Maximum Ratings@ $T_j=25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	650	V
V_{GS}	Gate-Source Voltage	± 20	V
V_{GS}	Gate-Source Voltage, AC ($f > 1\text{Hz}$)	± 30	V
$I_D@T_C=25^\circ\text{C}$	Drain Current, V_{GS} @ $10\text{V}^{3,4}$	20	A
$I_D@T_C=100^\circ\text{C}$	Drain Current, V_{GS} @ $10\text{V}^{3,4}$	12	A
I_{DM}	Pulsed Drain Current ¹	44	A
dv/dt	MOSFET dv/dt Ruggedness ($V_{DS} = 0 \dots 480\text{V}$)	50	V/ns
$P_D@T_C=25^\circ\text{C}$	Total Power Dissipation	34.7	W
$P_D@T_A=25^\circ\text{C}$	Total Power Dissipation	1.92	W
E_{AS}	Single Pulse Avalanche Energy ⁵	200	mJ
dv/dt	Peak Diode Recovery dv/dt ⁶	15	V/ns
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Data

Symbol	Parameter	Value	Units
R_{thj-c}	Maximum Thermal Resistance, Junction-case	3.6	$^\circ\text{C}/\text{W}$
R_{thj-a}	Maximum Thermal Resistance, Junction-ambient	65	$^\circ\text{C}/\text{W}$

Electrical Characteristics@T_j=25°C(unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =1mA	650	-	-	V
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =10V, I _D =6.2A	-	-	0.19	Ω
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250uA	2.5	-	4.5	V
g _{fs}	Forward Transconductance	V _{DS} =10V, I _D =6.2A	-	13	-	S
I _{DSS}	Drain-Source Leakage Current	V _{DS} =520V, V _{GS} =0V	-	-	100	uA
I _{GSS}	Gate-Source Leakage	V _{GS} =±20V, V _{DS} =0V	-	-	±1	uA
Q _g	Total Gate Charge	I _D =7.5A	-	35	56	nC
Q _{gs}	Gate-Source Charge	V _{DS} =480V	-	12	-	nC
Q _{gd}	Gate-Drain ("Miller") Charge	V _{GS} =10V	-	16	-	nC
t _{d(on)}	Turn-on Delay Time	V _{DD} =300V	-	16	-	ns
t _r	Rise Time	I _D =7.5A	-	25	-	ns
t _{d(off)}	Turn-off Delay Time	R _G =3.3Ω	-	36	-	ns
t _f	Fall Time	V _{GS} =10V	-	7	-	ns
C _{iss}	Input Capacitance	V _{GS} =0V	-	1400	2240	pF
C _{oss}	Output Capacitance	V _{DS} =100V	-	55	-	pF
C _{rss}	Reverse Transfer Capacitance	f=1.0MHz	-	10	-	pF
R _g	Gate Resistance	f=1.0MHz	-	4.5	9	Ω

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V _{SD}	Forward On Voltage ²	I _S =6.2A, V _{GS} =0V	-	0.8	1.5	V
t _{rr}	Reverse Recovery Time	I _S =7.5A, V _{GS} =0V	-	170	-	ns
Q _{rr}	Reverse Recovery Charge	di/dt=100A/μs	-	1.4	-	uC

Notes:

- 1.Pulse width limited by max. junction temperature.
- 2.Pulse test
- 3.Limited by max. junction temperature. Maximum duty cycle D=0.75
- 4.Ensure that the junction temperature does not exceed T_{Jmax}.
- 5.Starting T_j=25°C , V_{DD}=90V , L=100mH , R_G=25Ω , V_{GS}=10V
- 6.I_{SD} ≤ I_D, V_{DD} ≤ BV_{DSS}, starting T_J = 25°C

THIS PRODUCT IS SENSITIVE TO ELECTROSTATIC DISCHARGE, PLEASE HANDLE WITH CAUTION.

USE OF THIS PRODUCT AS A CRITICAL COMPONENT IN LIFE SUPPORT, AUTOMOTIVE OR OTHER SIMILAR SYSTEMS IS NOT AUTHORIZED.

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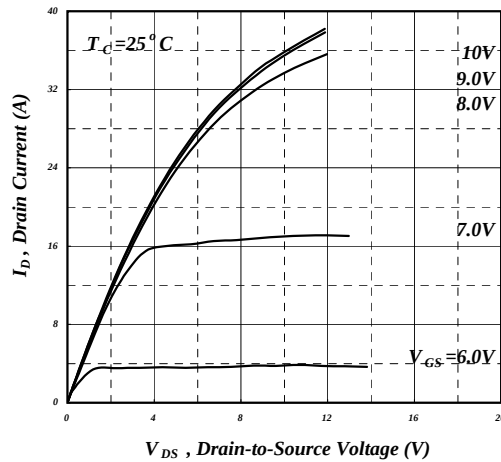


Fig 1. Typical Output Characteristics

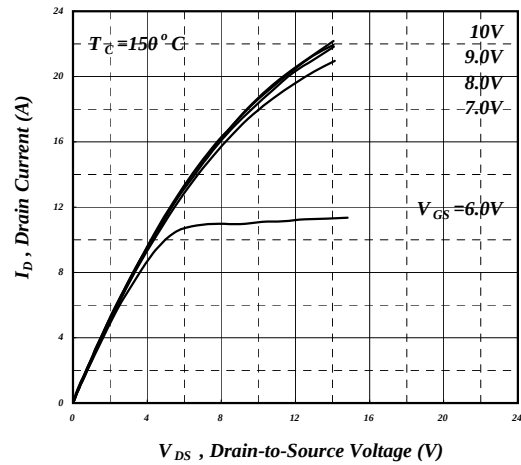


Fig 2. Typical Output Characteristics

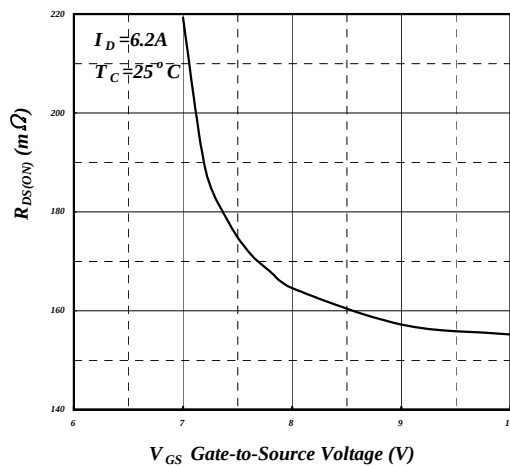
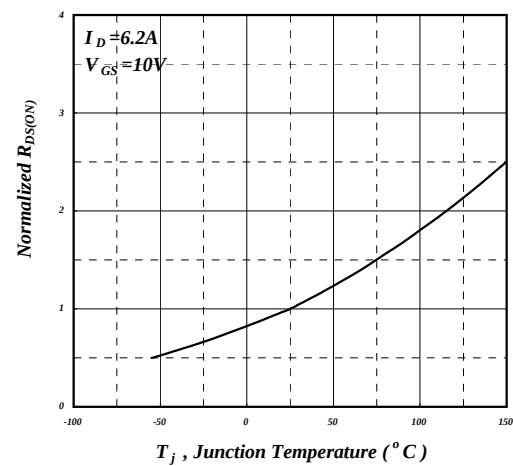
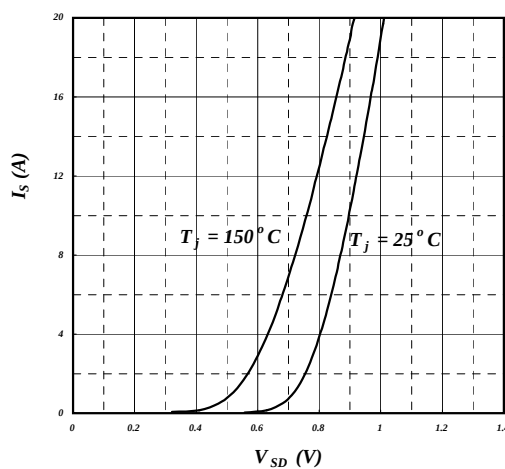


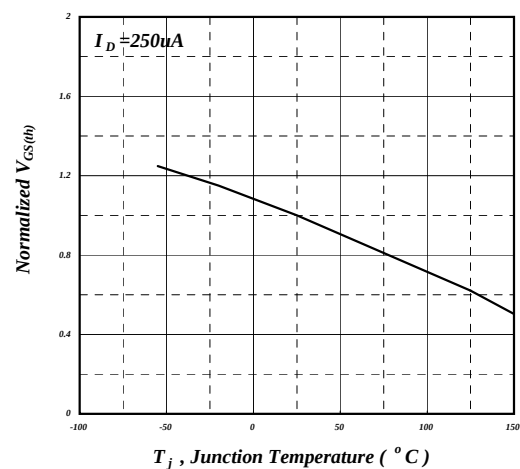
Fig 3. On-Resistance v.s. Gate Voltage



**Fig 4. Normalized On-Resistance
v.s. Junction Temperature**



**Fig 5. Forward Characteristic of
Reverse Diode**



**Fig 6. Gate Threshold Voltage v.s.
Junction Temperature**

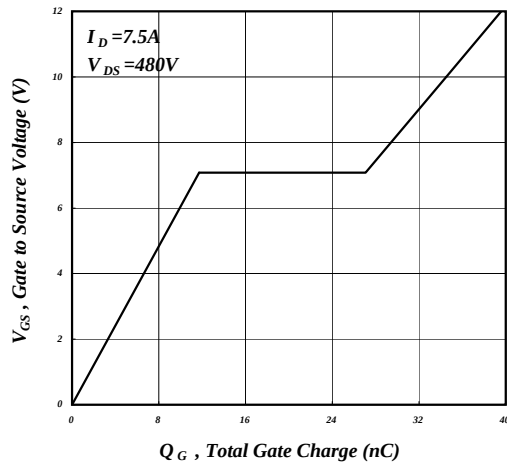


Fig 7. Gate Charge Characteristics

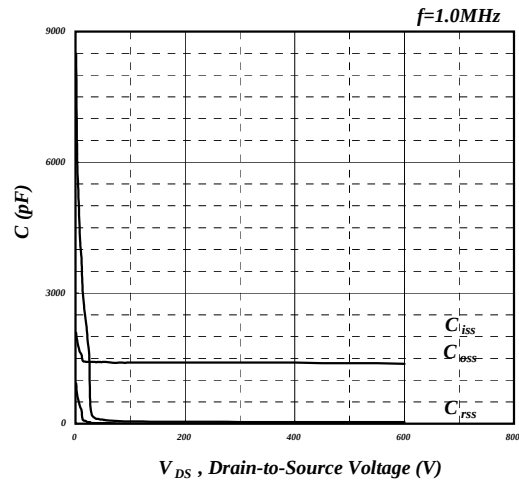


Fig 8. Typical Capacitance Characteristics

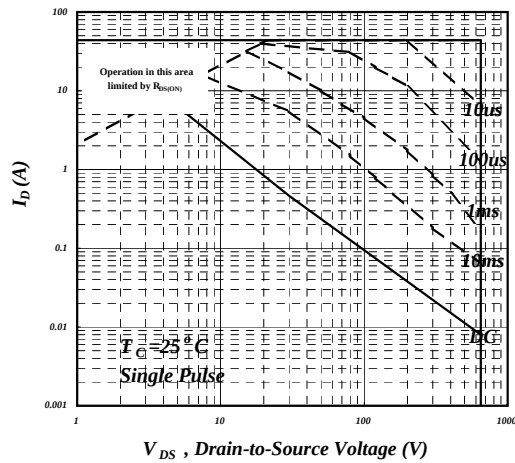


Fig 9. Maximum Safe Operating Area

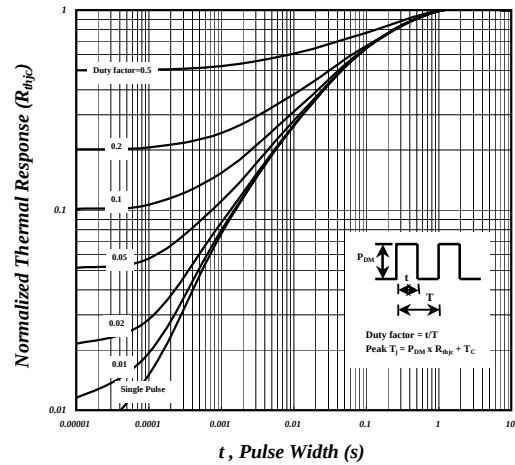


Fig10. Effective Transient Thermal Impedance

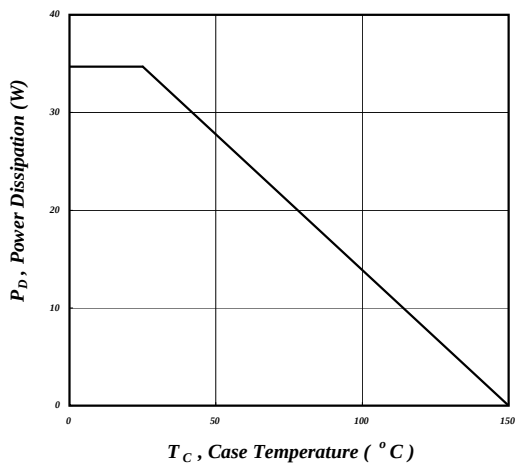


Fig 11. Total Power Dissipation

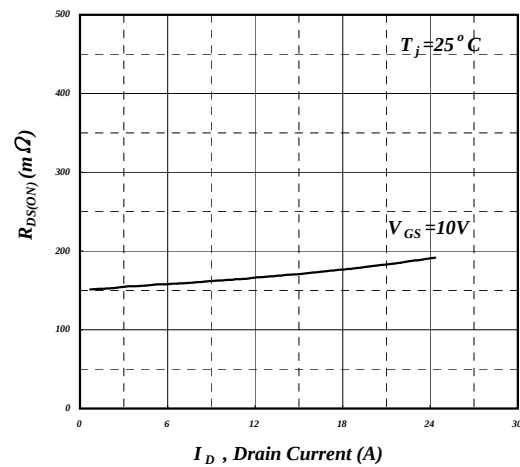
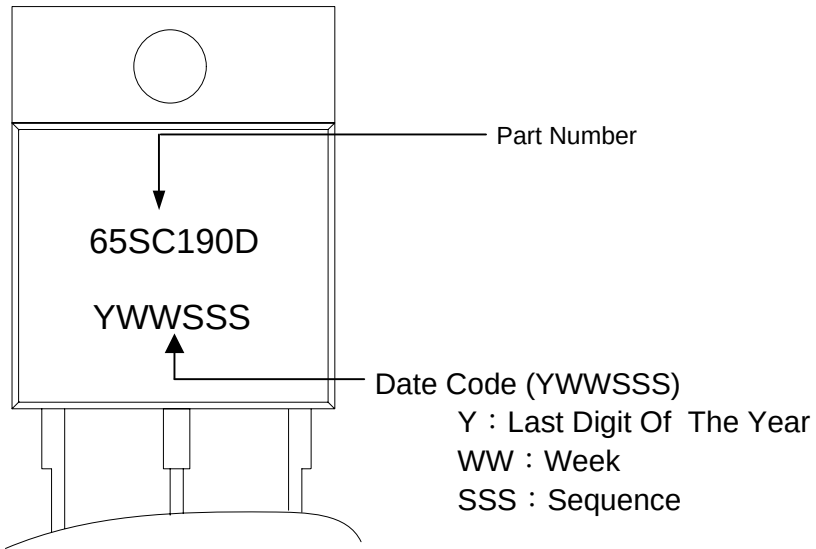
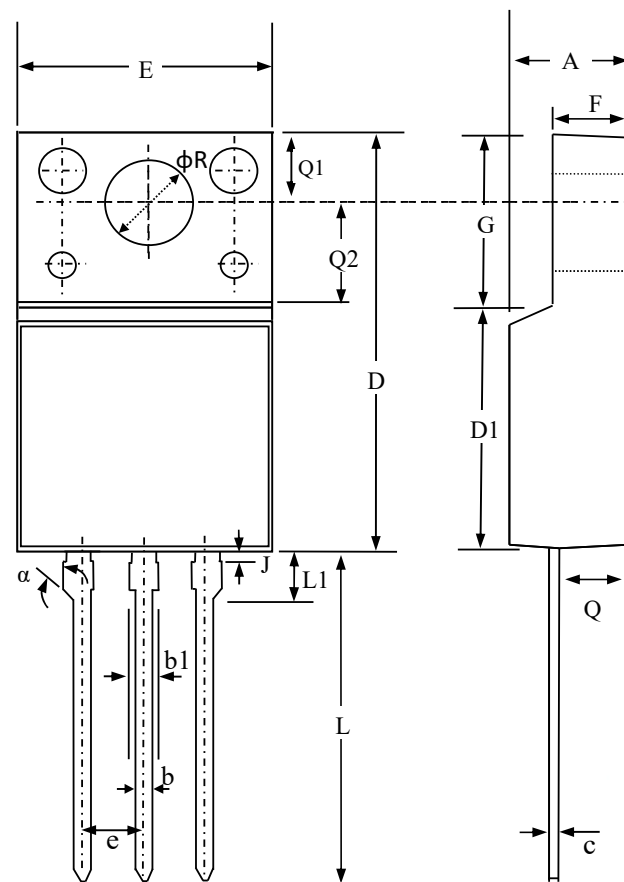


Fig 12. Typ. Drain-Source on State Resistance

MARKING INFORMATION

Package Outline : TO-220CFM-T



SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	4.30	4.50	4.70
b	0.54	0.69	0.84
b1	0.99	1.14	1.29
c	0.45	0.62	0.79
D	14.70	15.00	15.30
D1	8.5 Ref.		
e	2.54 Ref.		
E	9.70	10.00	10.30
F	2.50	2.70	2.90
G	6.30	6.70	7.10
L	12.50	13.00	13.50
L1	1.80	2.30	2.80
J	0.10	0.20	--
Q	2.50	2.60	2.90
Q1	2.90	3.10	3.30
Q2	3.5 Ref.		
ϕR	3.00	3.20	3.40
α	45° Ref.		

- 1.All dimension are in millimeters.
- 2.Dimension does not include burrs and mold flash/protrusions.
- 3.The outline schematic is not to scale and slightly different from the actual product appearance.

TO-220CFM-T FOOTPRINT :

