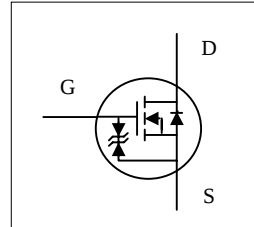


- ▼ 100% R_g & UIS Test
- ▼ Fast Switching Characteristic
- ▼ Simple Drive Requirement
- ▼ RoHS Compliant & Halogen-Free

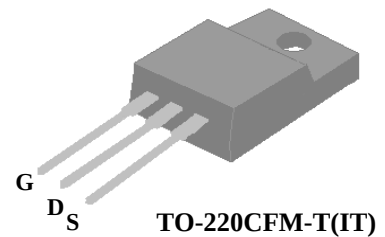


BV_{DS}	650V
$R_{DS(ON)}$	$0.2\ \Omega$
$I_D^{3,4}$	21.5A

Description

XP65CM200E 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°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 > 1Hz)	± 30	V
$I_D@T_C=25^\circ\text{C}$	Drain Current, V_{GS} @ $10V^{3,4}$	21.5	A
$I_D@T_C=100^\circ\text{C}$	Drain Current, V_{GS} @ $10V^{3,4}$	13.6	A
I_{DM}	Pulsed Drain Current ¹	55	A
dv/dt	MOSFET dv/dt Ruggedness ($V_{DS} = 0 \dots 480V$)	20	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	50	V/ns
T_{STG}	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	°C

Thermal Data

Symbol	Parameter	Value	Units
Rthj-c	Maximum Thermal Resistance, Junction-case	3.6	°C/W
Rthj-a	Maximum Thermal Resistance, Junction-ambient	65	°C/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 =5A	-	-	0.2	Ω
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250uA	2	-	4	V
g _{fs}	Forward Transconductance	V _{DS} =10V, I _D =5A	-	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 ⁷	I _D =5A	-	33	52.8	nC
Q _{gs}	Gate-Source Charge ⁷	V _{DS} =520V	-	7	-	nC
Q _{gd}	Gate-Drain ("Miller") Charge ⁷	V _{GS} =10V	-	12	-	nC
t _{d(on)}	Turn-on Delay Time ⁷	V _{DD} =325V	-	14	-	ns
t _r	Rise Time ⁷	I _D =5A	-	13	-	ns
t _{d(off)}	Turn-off Delay Time ⁷	R _G =3.3Ω	-	67	-	ns
t _f	Fall Time ⁷	V _{GS} =10V	-	17	-	ns
C _{iss}	Input Capacitance ⁷	V _{GS} =0V	-	1380	2208	pF
C _{oss}	Output Capacitance ⁷	V _{DS} =100V	-	35	-	pF
C _{rss}	Reverse Transfer Capacitance ⁷	f=1.0MHz	-	10	-	pF
R _g	Gate Resistance	f=1.0MHz	-	9	18	Ω

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V _{SD}	Forward On Voltage ²	I _S =5A, V _{GS} =0V	-	-	1.5	V
t _{rr}	Reverse Recovery Time ⁷	I _S =5A, V _{GS} =0V	-	220	-	ns
Q _{rr}	Reverse Recovery Charge ⁷	di/dt=100A/μs	-	2	-	uC

Notes:

- 1.Pulse width limited by max. junction temperature.
- 2.Pulse test
- 3.Limited by max. junction temperature. Maximum duty cycle D=0.5
- 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 , I_{AS}=2A
- 6.I_{SD} ≤ I_D, V_{DD} ≤ BV_{DSS}, starting T_J = 25°C
- 7.Guaranteed by design.

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.

XSEMI DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

XSEMI RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN.

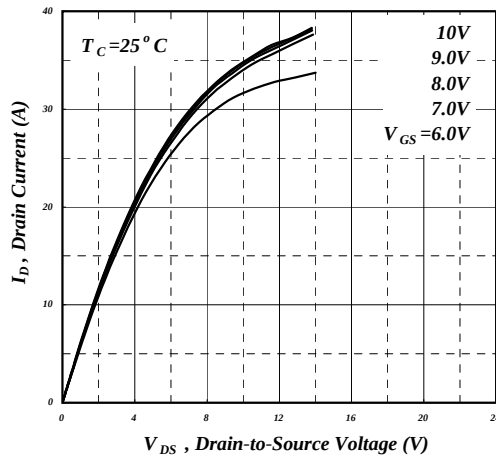


Fig 1. Typical Output Characteristics

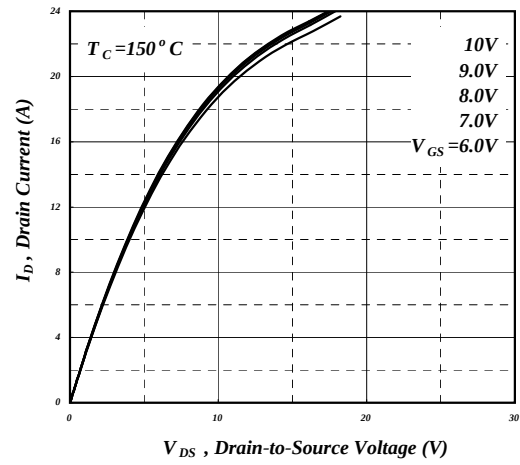


Fig 2. Typical Output Characteristics

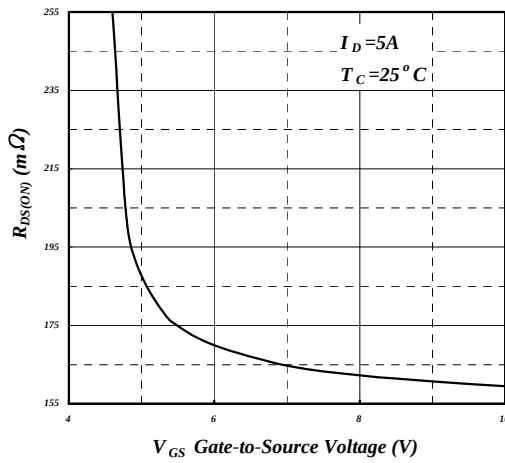
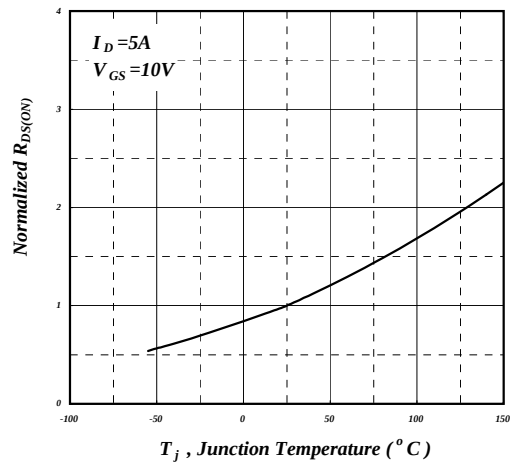
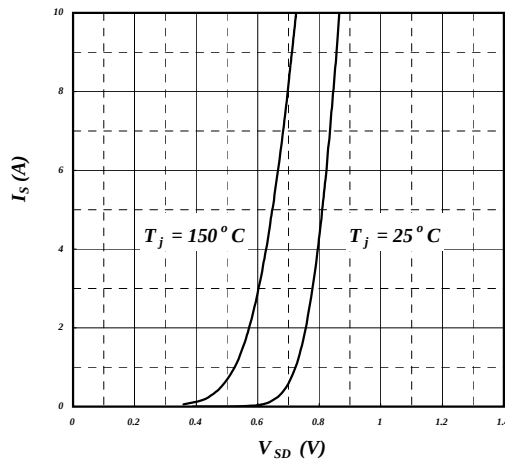


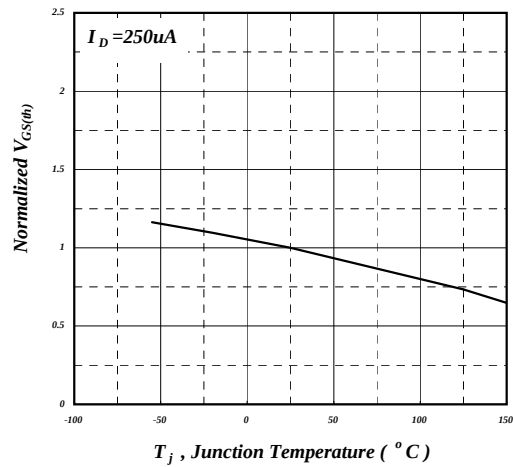
Fig 3. On-Resistance v.s. Gate Voltage



**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**

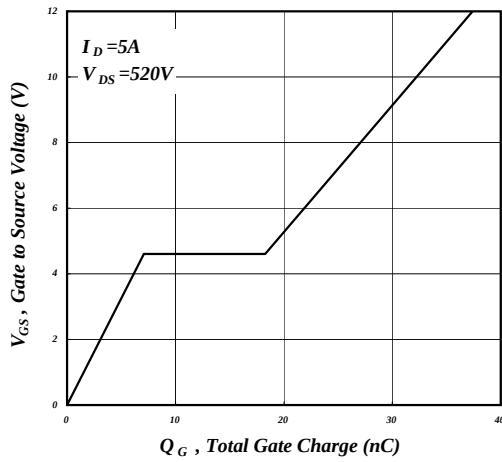


Fig 7. Gate Charge Characteristics

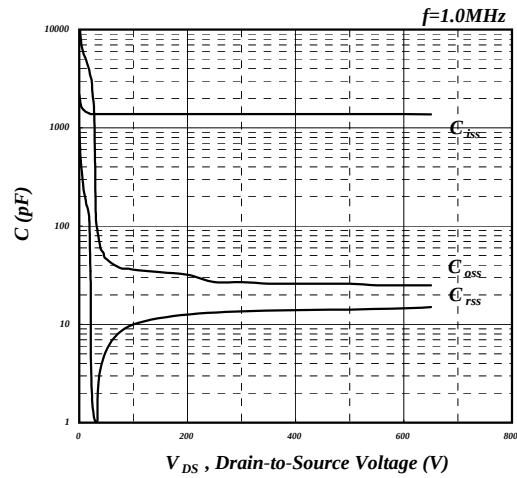


Fig 8. Typical Capacitance Characteristics

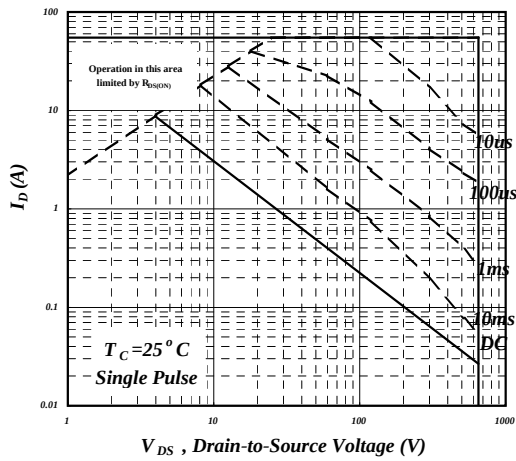


Fig 9. Maximum Safe Operating Area

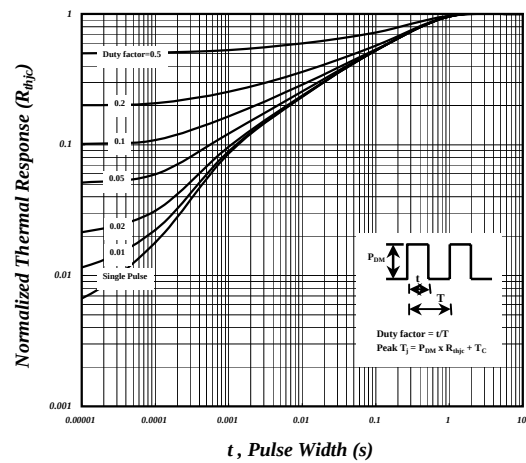


Fig10. Effective Transient Thermal Impedance

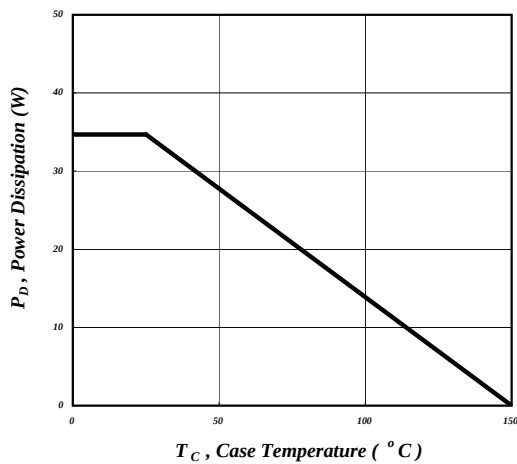


Fig 11. Total Power Dissipation

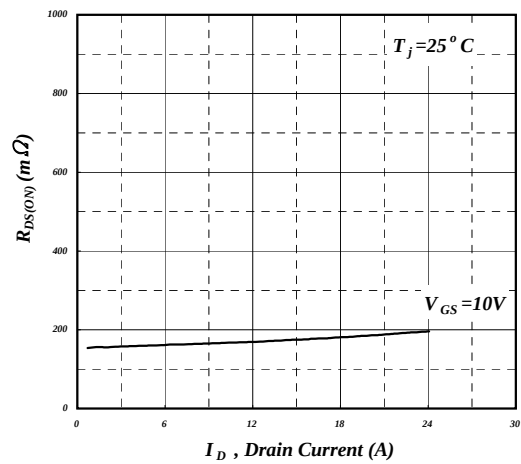


Fig 12. Typ. Drain-Source on State Resistance

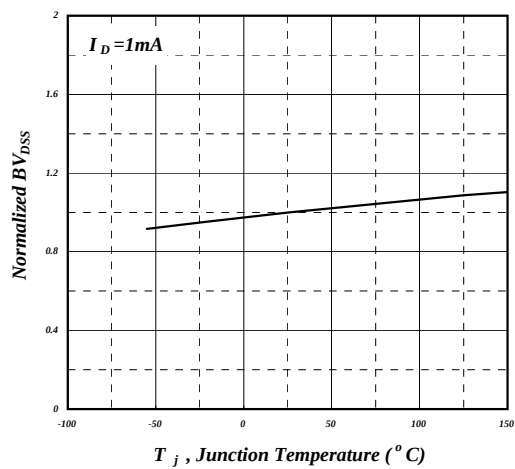
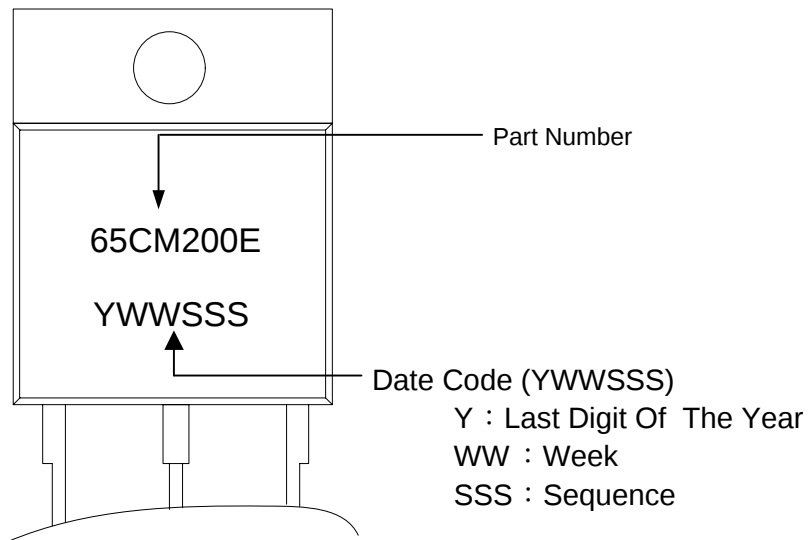
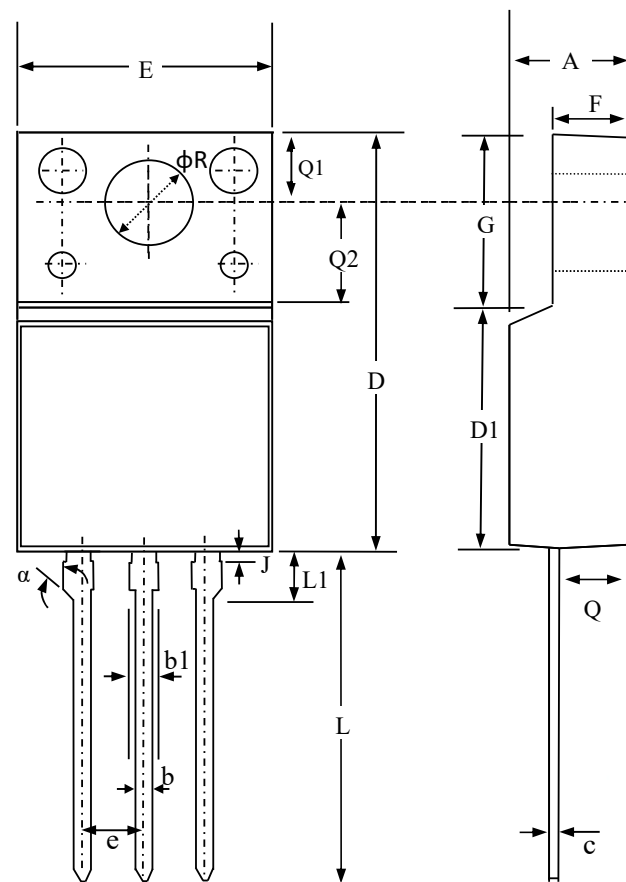


Fig 13. Normalized BV_{DSS} v.s. Junction Temperature

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.		
phi R	3.00	3.20	3.40
alpha	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 :

