N-Ch 650V High Speed Switching MOSFETs

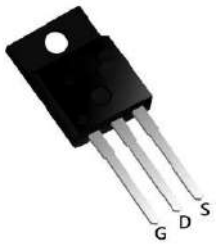
Features

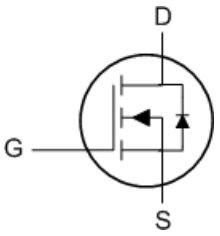
- Advanced Super Junction Technology
- Low Power Loss by High Speed Switching
- Low $R_{DS(ON)}$
- 100% EAS Guaranteed
- Green Device Available

Applications

- PFC Power Supply Stages.
- Switching Applications.
- Adapter.

TO220F Pin Configuration





Product Summary

BVDSS	RDSON	ID
650V	380mΩ	10.6A

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	650	V
V_{GS}	Gate-Source Voltage	±30	V
I_D@T_C=25℃	Continuous Drain Current[1]	10.6	A
I_D@T_C=100℃	Continuous Drain Current[1]	6.7	A
I_{DM}	Pulsed Drain Current[1]	31.8	A
EAS	Single Pulse Avalanche Energy[3]	216	mJ
dv/dt	MOSFET dv/dt Ruggedness[4]	50	V/ns
dv/dt	Diode dv/dt Ruggedness[4]	15	V/ns
P_D@T_C=25℃	Total Power Dissipation[1]	30.5	W
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	---	75	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case	---	4.1	℃/W

Electrical Characteristics (T_J=25 ℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	650	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V , I_D=3.2A	---	320	380	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	2	3	4	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=650V , V_{GS}=0V , T_J=25℃	---	---	1	uA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±30V , V_{DS}=0V	---	---	±100	nA
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	19	---	Ω
Qg	Total Gate Charge	V_{DS}=520V , V_{GS}=10V , I_D=10.6A	---	20.6	---	nC
Qgs	Gate-Source Charge		---	5.3	---	
Qgd	Gate-Drain Charge		---	7.5	---	
Td(on)	Turn-On Delay Time	V_{DD}=325V , V_{GS}=10V , R_G=25Ω, I_D=10.6A	---	19	---	ns
Tr	Rise Time		---	38	---	
Td(off)	Turn-Off Delay Time		---	108	---	
Tf	Fall Time		---	36	---	
Ciss	Input Capacitance	V_{DS}=25V , V_{GS}=0V , f=1MHz	---	763	---	pF
Coss	Output Capacitance		---	896	---	
Crss	Reverse Transfer Capacitance		---	38.7	---	
Co(er)	Effective Output Capacitance Energy Related[6]	V_{DS}=0 to 520V, V_{GS}=0V, f=1MHz	---	23.7	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current[1,5]	V_G=V_D=0V , Force Current	---	---	10.6	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=10.6A , T_J=25℃	---	---	1.4	V
t_{rr}	Reverse Recovery Time	I_{SD}=10.6A , di/dt=100A/μs , V_{DD}=100V , T_C=25℃	---	324	---	nS
Q_{rr}	Reverse Recovery Charge		---	3.8	---	uC
I_{mm}	Reverse Recovery Current		---	23.2	---	A

Note :

1. Pulse width limited by max. junction temperature.
2. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%
3. The EAS data shows Max. rating . The test condition is V_{DD}=50V, V_{GS}=10V, L=150mH, I_{AS}=1.7A
4. I_{SD} ≦ I_D, V_{DD} ≦ BV_{DSS}, starting T_J=25℃
5. The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.
6. $C_{O(er)}$ is a capacitance that gives the same stored energy as C_{OSS} while V_{DS} is rising from 0V to 80% BV_{DSS}

Typical Characteristics

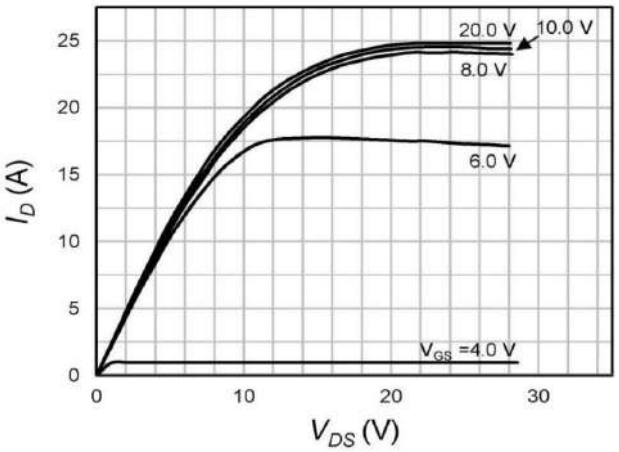


Fig.1 Typical Output Characteristics

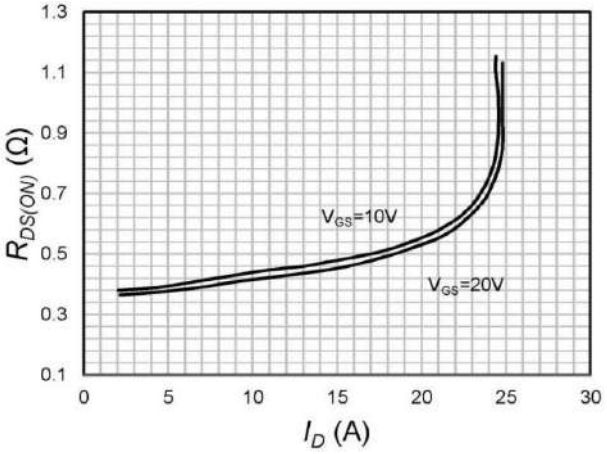


Fig.2 On-Resistance vs Drain Current

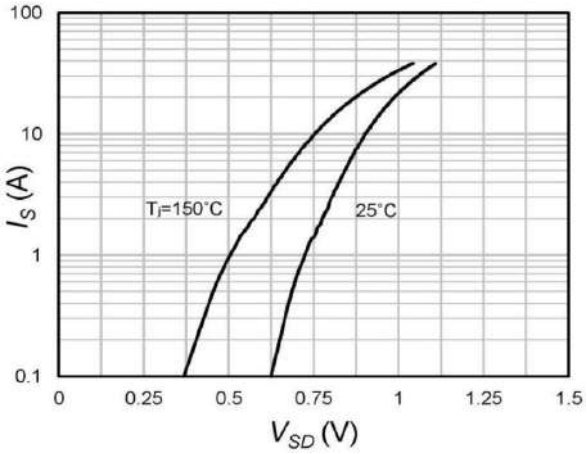


Fig.3 Source Drain Forward Characteristics

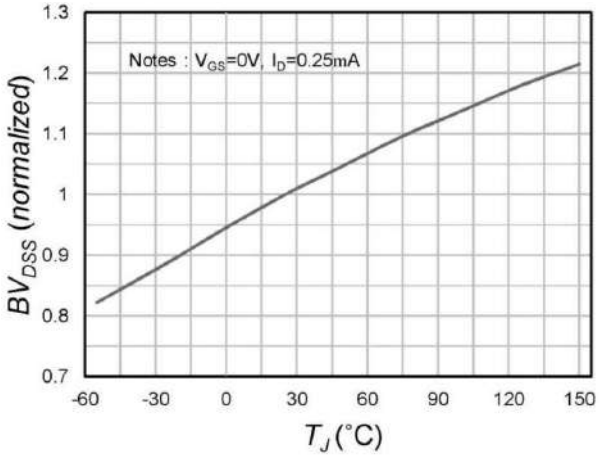


Fig.4 Normalized BV_{DSS} vs T_J

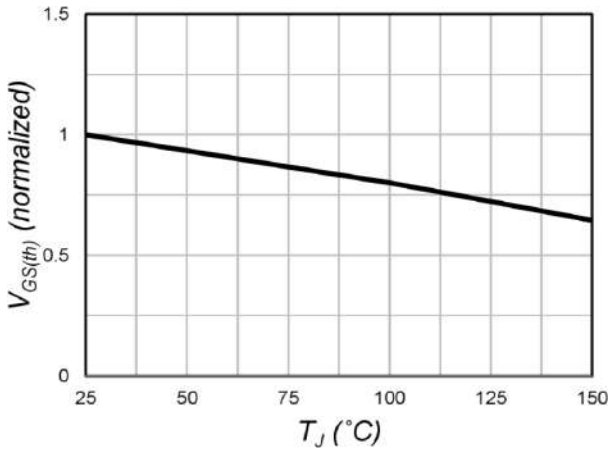


Fig.5 Normalized $V_{GS(th)}$ vs T_J

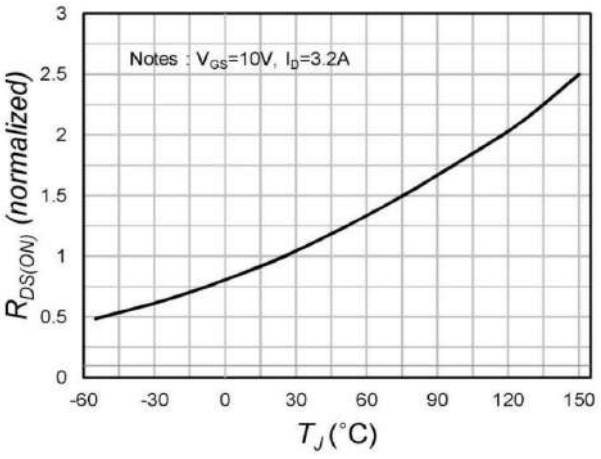


Fig.6 Normalized R_{DSON} vs T_J

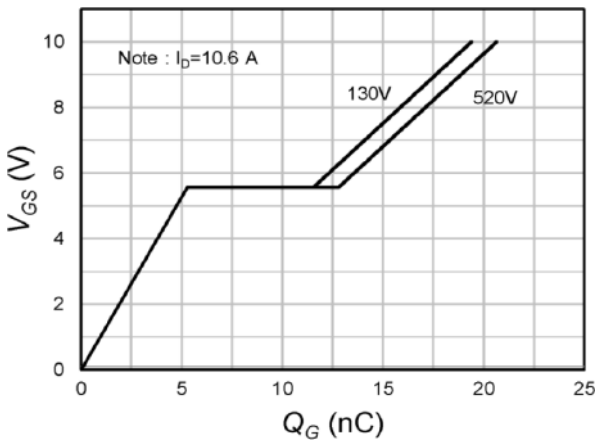


Fig.7 Gate-Charge Characteristics

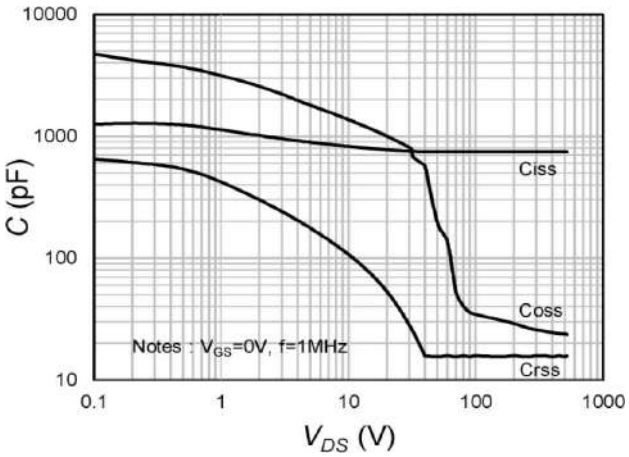


Fig.8 Capacitance Characteristics

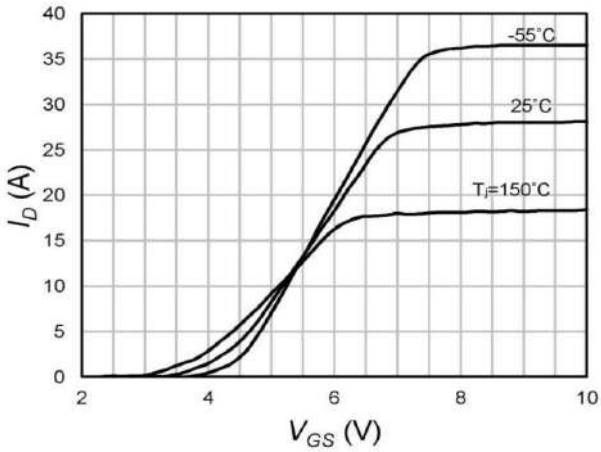


Fig.9 Transfer Characteristics

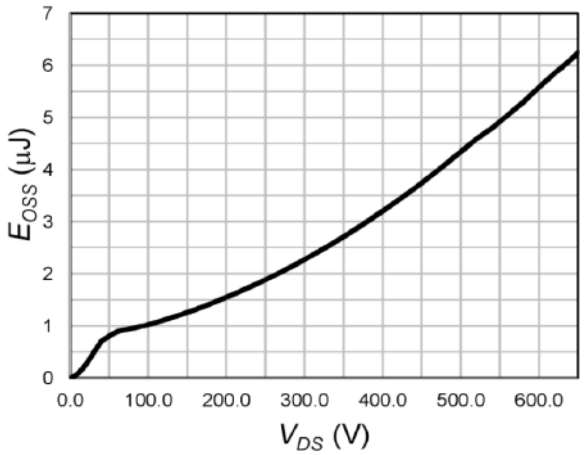


Fig.10 Output Capacitance Stored Energy

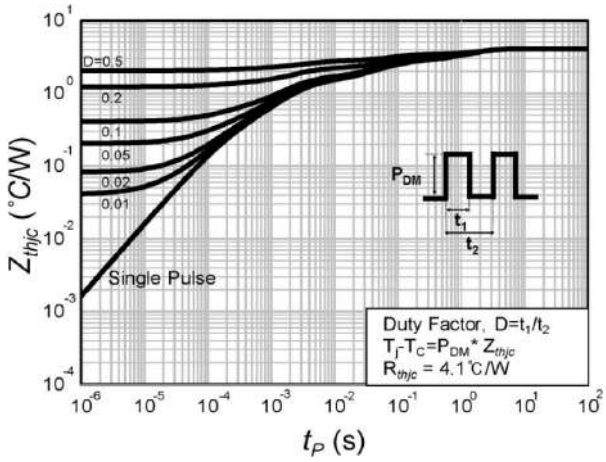


Fig.11 Transient Thermal Response Curve

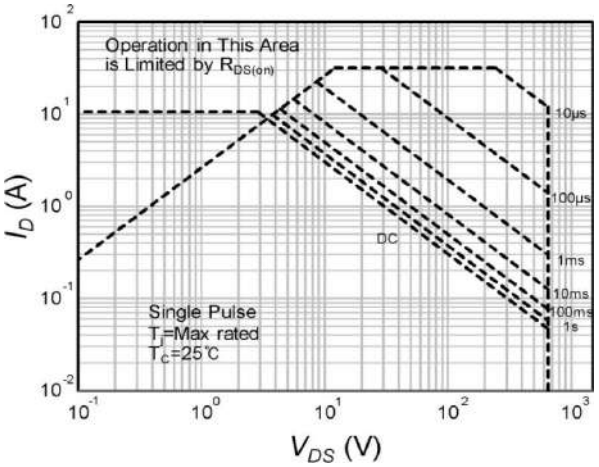


Fig.12 Safe Operating Area

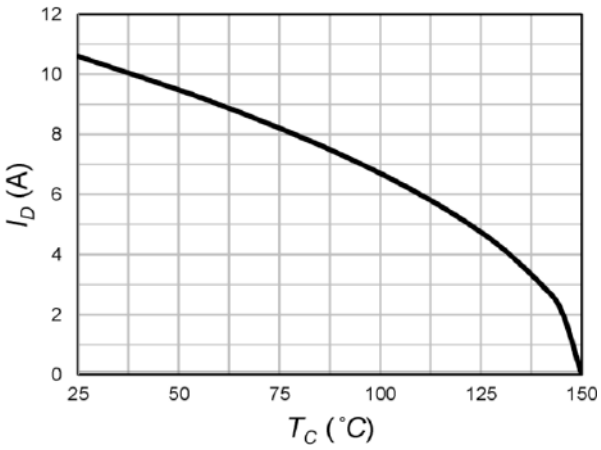


Fig.13 Maximum Drain Current vs T_C

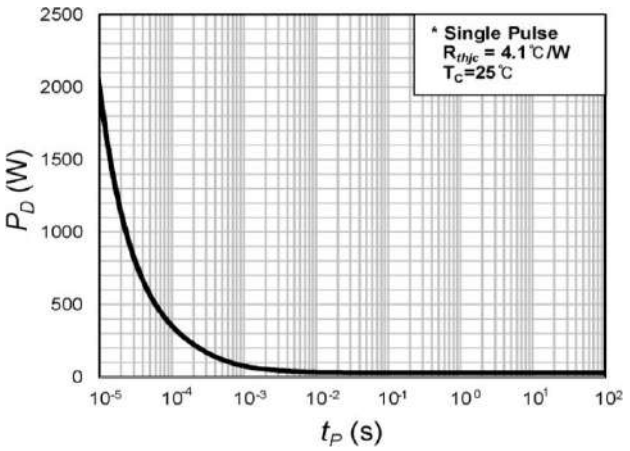
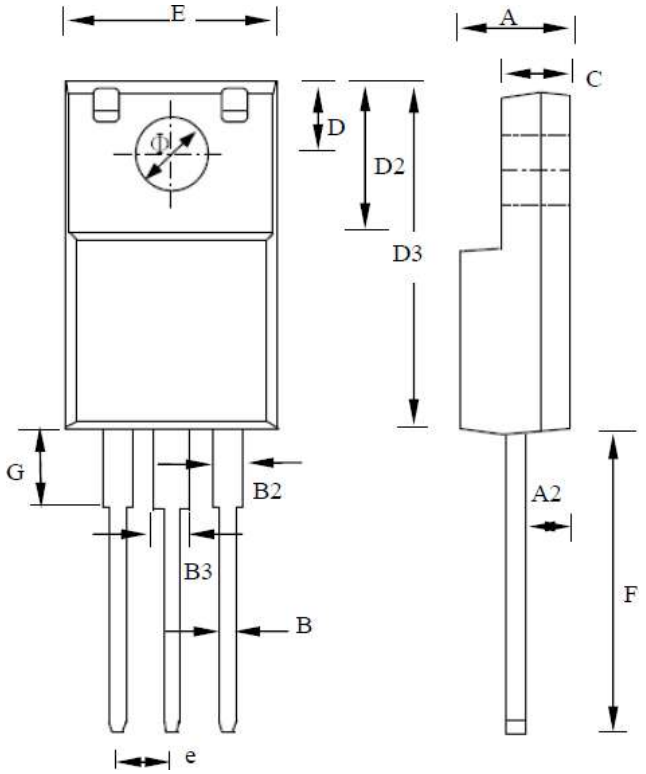


Fig.14 Single Pulse Maximum P_D

TO220F Package Outline



Symbols	Millimeters		Inches	
	MIN	MAX	MIN	MAX
A	4.50	4.90	0.1772	0.1929
A2	2.55	2.95	0.1004	0.1161
B	0.70	0.92	0.0275	0.0362
B2	1.10	1.50	0.0433	0.0590
B3	1.05	1.38	0.0413	0.0543
C	2.34	2.74	0.0921	0.1078
D	3.10	3.50	0.1220	0.1378
D2	6.48	6.88	0.2551	0.2708
D3	15.57	16.17	0.6130	0.6366
E	9.96	10.44	0.3921	0.4110
e	2.540 BSC		0.100 BSC	
F	12.68	13.28	0.4992	0.5228
G	3.25	3.65	0.1279	0.1437
Φ	3.08	3.28	0.1212	0.1291