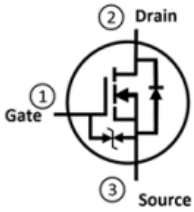
650V N-Channel Super Junction MOSFET

Voltage	**650 V**	**Rdson**	**180 mΩ**
Current	**19.6 A**	**Qg**	**34.3 nC**

ITO-220AB-F



Feature:

- $R_{DS(ON)\ Max}$, V_{GS}@10V : 180mΩ
- Body diode with fast recovery characteristics
- With ESD protection, HBM> 2kV
- 100% Avalanche Tested
- 100% Rg Tested
- Lead free in compliance with EU RoHS 2.0
- Green molding compound as per IEC 61249 standard

Mechanical Data

- Case: ITO-220AB-F package
- Terminals: Solderable per MIL-STD-750, Method 2026
- Approx. Weight: 2 grams

Application

- TV Power, PC Power, PD Charger, Adapter, UPS

Absolute Maximum Ratings (T_A = 25 °C unless otherwise specified)

PARAMETER		SYMBOL	LIMIT	UNITS
Drain-Source Voltage @ T_{jmax}		V_{DS}	700	V
Drain-Source Voltage		V_{DS}	650	
Gate-Source Voltage		V_{GS}	±30	
Continuous Drain Current (Note 7)	T_C=25°C	I_D	19.6	A
	T_C=100°C		12.4	
Pulsed Drain Current	T_C=25°C	I_{DM}	47	A
Single Pulse Avalanche Energy (Note 6)		E_{AS}	80	mJ
MOSFET dv/dt ruggedness		dv/dt	120	V/ns
Diode dv/dt		dv/dt	70	V/ns
Insulation Withstand Voltage for ITO-220AB-F (Note 8)		V_{ISO}	3.5	kV
Power Dissipation	T_C=25°C	P_D	73.5	W
	T_C=100°C		29.4	
Operating Junction and Storage Temperature Range		T_J,T_{STG}	-55~150	°C

Thermal Characteristics

PARAMETER		SYMBOL	VALUES			UNITS
			MIN.	TYP.	MAX.	
Thermal Resistance	Junction-to-Case (Bottom)	$R_{\theta JC}$	-	0.8	1.5	°C/W
	Junction-to-Ambient (Note 3)	$R_{\theta JA}$	-	46.2	60	°C/W

Electrical Characteristics (T_A = 25 °C unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNITS
Static						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250uA	650	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250uA	3.3	4.0	4.7	
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS}=10V, I_D=7A (Note 1)	-	156	180	mΩ
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=650V, V_{GS}=0V	-	-	10	uA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V	-	-	±1	uA
Dynamic (Note 5)						
Total Gate Charge	Q_g	V_{DS}=400V, I_D=14A, V_{GS}=10V	-	34.3	-	nC
Gate-Source Charge	Q_{gs}		-	9.7	-	
Gate-Drain Charge	Q_{gd}		-	14.6	-	
Input Capacitance	Ciss	V_{DS}=400V, V_{GS}=0V, f=250kHz	-	1492	-	pF
Output Capacitance	Coss		-	22.8	-	
Reverse Transfer Capacitance	Crss		-	3	-	
Effective Output Capacitance Energy Related	Co(er)	V_{DS}=0V to 400V, V_{GS}=0V (Note 4)	-	44.1	-	pF
Turn-On Delay Time	$td_{(on)}$	V_{DD}=400V, I_D=14A, V_{GS}=10V, R_G=25Ω (Note 2)	-	37.7	-	ns
Turn-On Rise Time	t_r		-	73.1	-	
Turn-Off Delay Time	$td_{(off)}$		-	118.9	-	
Turn-Off Fall Time	t_f		-	45.7	-	
Gate Resistance	Rg	f=1.0MHz	-	9.2	-	Ω
Drain-Source Diode						
Maximum Continuous Drain-Source Diode Forward Current	I_S		-	-	19.6	A
Diode Forward Voltage	V_{SD}	I_S=7A, V_{GS}=0V	-	0.90	1.5	V
Reverse Recovery Charge	Q_{rr}	I_S=14A di/dt=100A/μs	-	0.7	-	uC
Reverse Recovery Time	T_{rr}		-	129	-	ns

NOTES :

1. Pulse width≤300us, Duty cycle≤2%.
2. Essentially independent of operating temperature typical characteristics.
3. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance.
4. $C_{o(er)}$ is a capacitance that gives the same stored energy as Coss while V_{DS} is rising from 0V to 400V.
5. Guaranteed by design, not subject to production testing.
6. E_{AS} is calculated based on the condition of L = 10 mH, I_{AS} = 4 A, V_{DD} = 50 V, V_{GS} = 10 V, however by 0.1mH, I_{AS} = 5.5 A 100% test in production.
7. Continue current value is calculation by Duty = 50%.
8. It's 100% test during mass production by Vdc= 3.5kV with 1sec.

TYPICAL CHARACTERISTIC CURVES

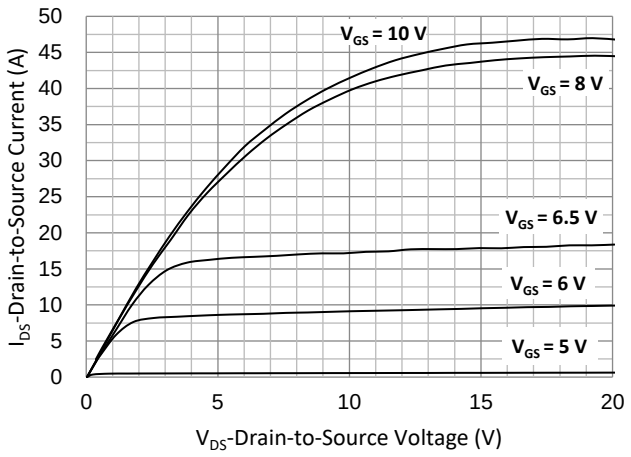


Fig.1 Output Characteristics

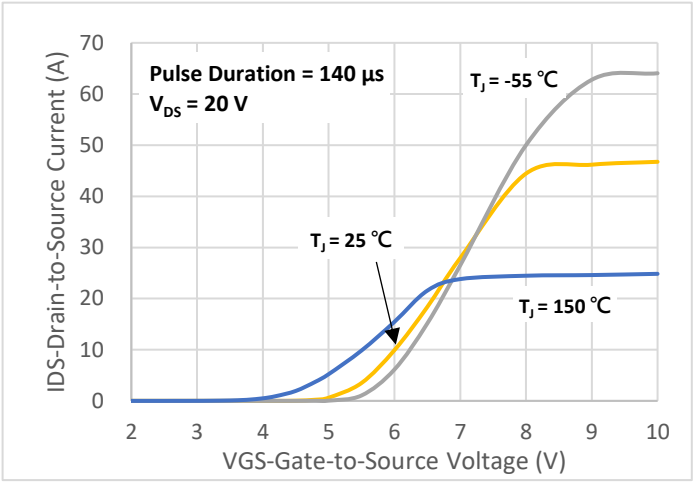


Fig.2 Transfer Characteristics

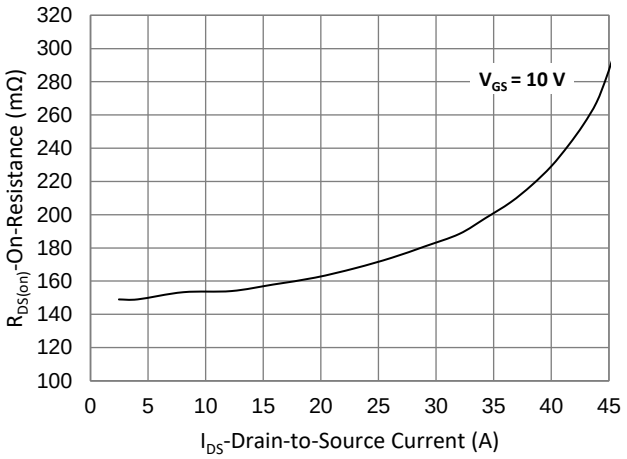


Fig.3 On-Resistance vs. Drain Current

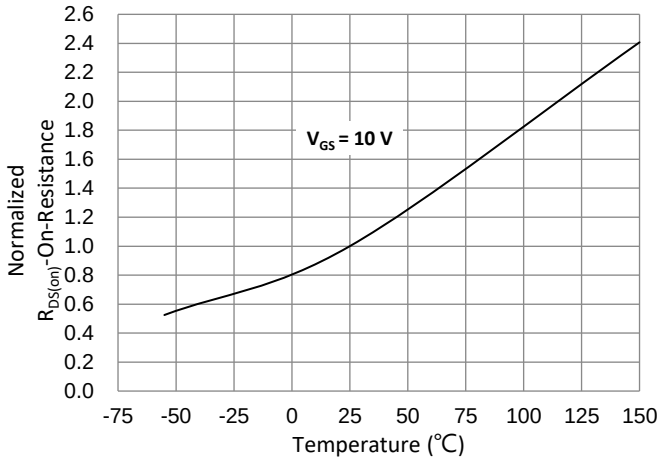


Fig.4 On-Resistance vs. Junction Temperature

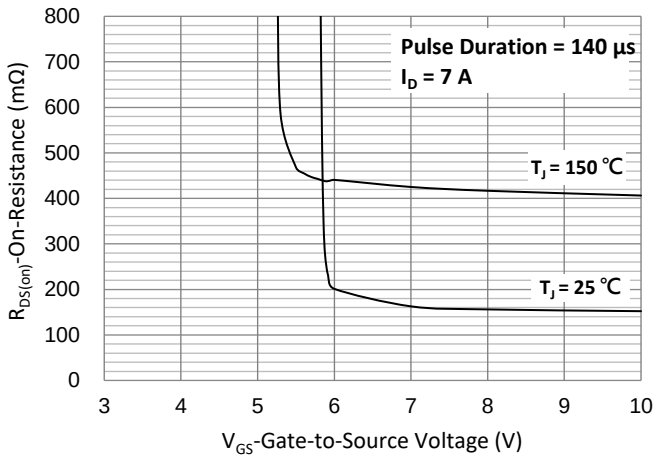


Fig.5 Capacitance vs. Drain-Source Voltage

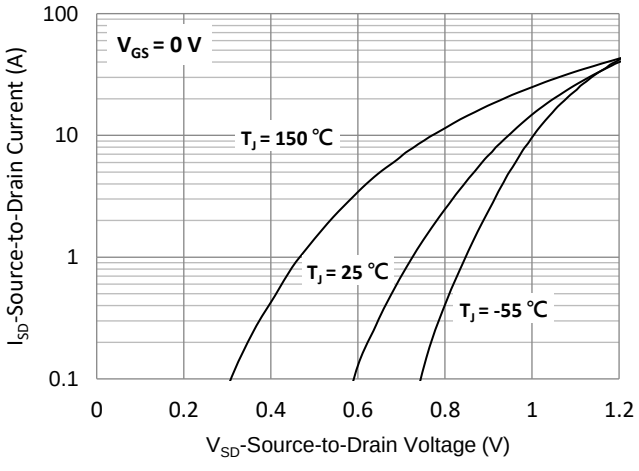


Fig.6 Source-Drain Diode Forward Voltage

TYPICAL CHARACTERISTIC CURVES

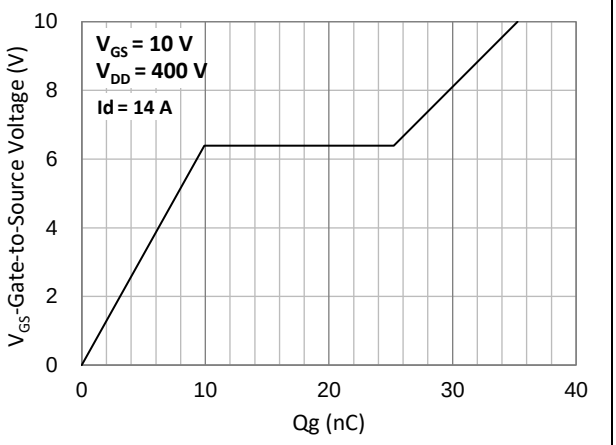


Fig.7 Gate-Charge Characteristics

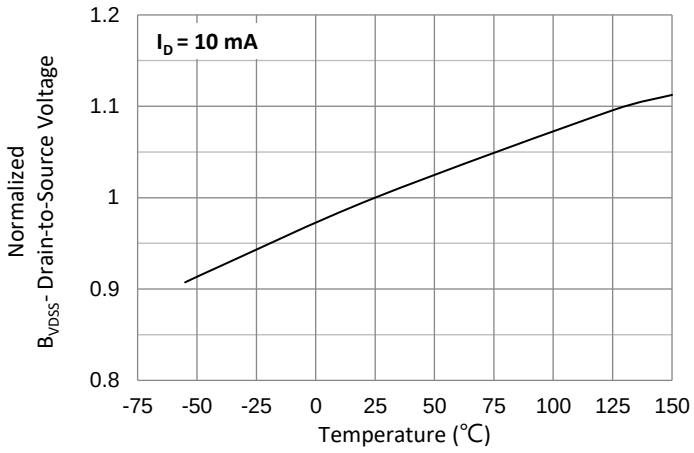


Fig.8 Breakdown Voltage Variation vs. Temperature

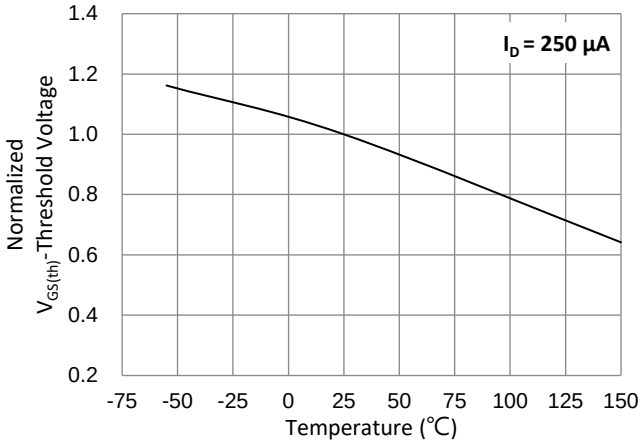


Fig.9 Threshold Voltage Variation with Temperature

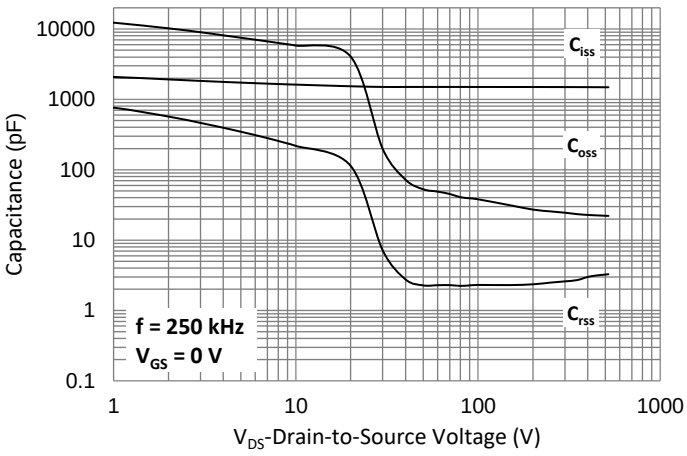


Fig.10 Drain Current vs. Case Temperature

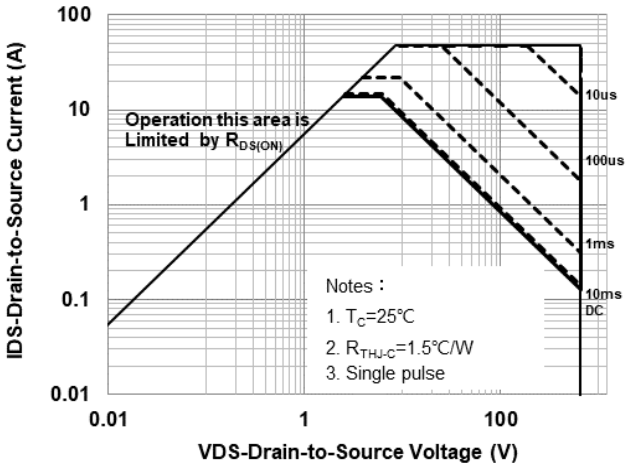


Fig.11 Maximum Safe Operating Area

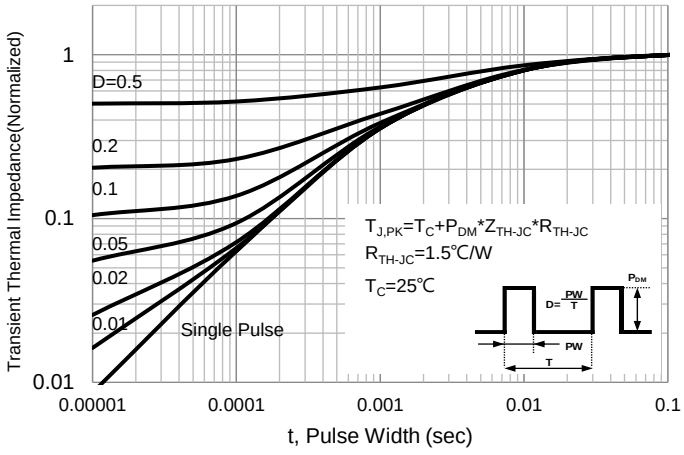


Fig.12 Normalized Transient Thermal Impedance

TYPICAL CHARACTERISTIC CURVES

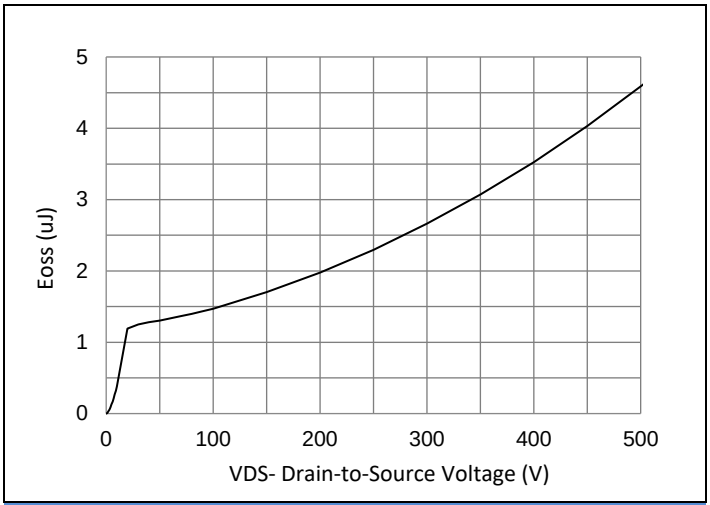


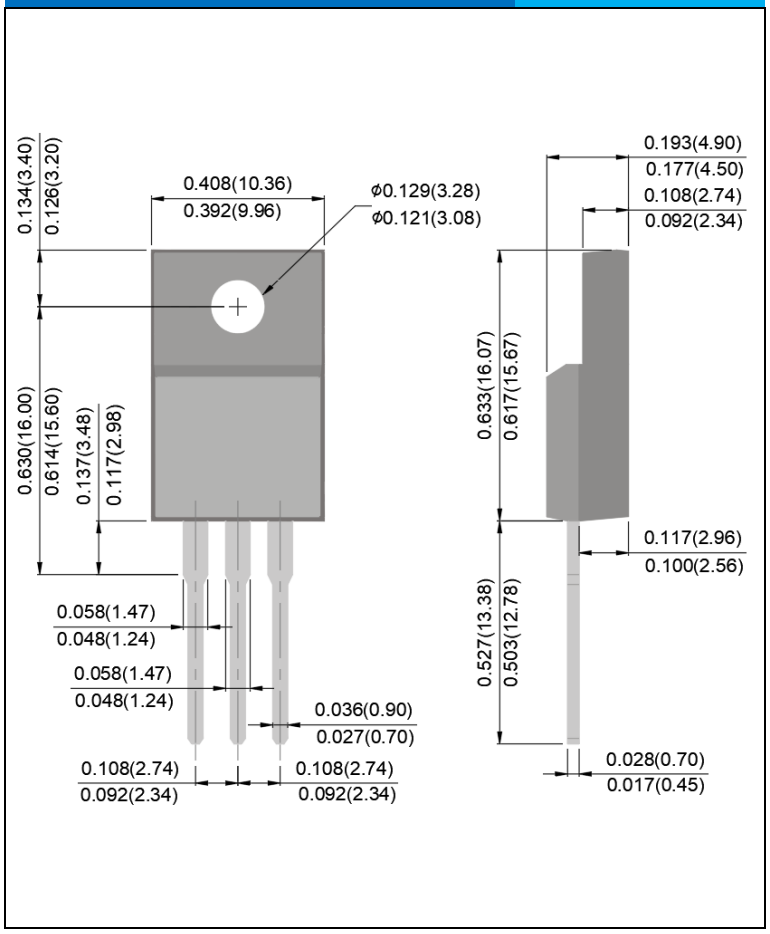
Fig.13 Typ. Coss Stored Energy

Product and Packing Information

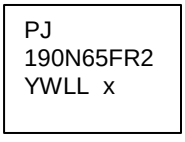
Part No.	Package Type	Packing Type	Marking
PJMF190N65FR2	ITO-220AB-F	50pcs / Tube	190N65FR2

Packaging Information

ITO-220AB-F Dimension — Unit: inch(mm)



Marking Diagram



Y = Year Code
W = Week Code (A~Z)
LL = Lot Code (00~99)
x = Production Line Code

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