

## 650V N-Channel Super Junction MOSFET

<b>Voltage</b>	<b>650 V</b>	<b>Rdson</b>	<b>210 mΩ</b>
<b>Current</b>	<b>19 A</b>	<b>Qg</b>	<b>34 nC</b>

### Feature:

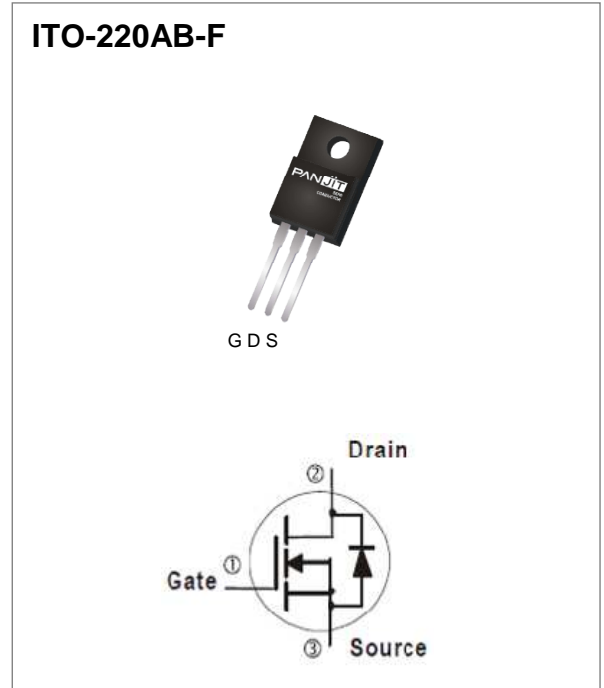
- $R_{DS(ON) Max, V_{GS}@10V}$ : 210mΩ
- Easy to use/ drive
- High Speed Switching and Low  $R_{DS(ON)}$
- 100% Avalanche Tested
- 100% Rg Tested
- Lead free in compliance with EU RoHS 2.0
- Green molding compound as per IEC 61249 standard

### Mechanical Data

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

### Application

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



## Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ 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		$V_{GS}$	$\pm 30$	
Continuous Drain Current	$T_C=25^\circ\text{C}$	$I_D$	19.0	A
	$T_C=100^\circ\text{C}$		11.2	
Pulsed Drain Current	$T_C=25^\circ\text{C}$	$I_{DM}$	42	A
Single Pulse Avalanche Energy		$E_{AS}$	420	mJ
MOSFET dv/dt ruggedness		dv/dt	50	V/ns
Power Dissipation	$T_C=25^\circ\text{C}$	$P_D$	32	W
	$T_C=100^\circ\text{C}$		12.8	
Insulation Withstand Voltage for ITO-220AB-F		$V_{ISO}$	3.5	kV
Operating Junction and Storage Temperature Range		$T_J, T_{STG}$	-55~150	$^\circ\text{C}$

### Thermal Characteristics

PARAMETER		SYMBOL	MAXIMUM	UNITS
Thermal Resistance	Junction-to-Case	$R_{\theta JC}$	3.9	$^\circ\text{C/W}$
	Junction-to-Ambient (Note 3)	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$

## Electrical Characteristics (T<sub>A</sub> = 25 °C unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNITS
<b>Static</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	650	730	-	V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA	2	3.0	4	
Drain-Source On-State Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =9.5A <sup>(Note 1)</sup>	-	183	210	mΩ
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =650V, V <sub>GS</sub> =0V	-	-	1	uA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±30V, V <sub>DS</sub> =0V	-	-	±100	nA
Transfer characteristics	gfs	V <sub>DS</sub> =20V, I <sub>D</sub> =19A	-	21.8	-	S
<b>Dynamic</b> <sup>(Note 5)</sup>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =520V, I <sub>D</sub> =19A, V <sub>GS</sub> =10V	-	34	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	7.7	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	13.5	-	
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =400V, V <sub>GS</sub> =0V, f=250kHz	-	1412	-	pF
Output Capacitance	C <sub>oss</sub>		-	50	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	6.8	-	
Effective Output Capacitance Energy Related	C <sub>o(er)</sub>		V <sub>DS</sub> =0V to 400V, V <sub>GS</sub> =0V, f=250kHz <sup>(Note 4)</sup>	-	64	
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =325V, I <sub>D</sub> =19A, V <sub>GS</sub> =10V, R <sub>G</sub> =25Ω <sup>(Note 2)</sup>	-	30	-	ns
Turn-On Rise Time	t <sub>r</sub>		-	65	-	
Turn-Off Delay Time	t <sub>d(off)</sub>		-	111	-	
Turn-Off Fall Time	t <sub>f</sub>		-	61	-	
Gate Resistance	R <sub>g</sub>	f=1.0MHz	-	1.7	-	Ω
<b>Drain-Source Diode</b>						
Maximum Continuous Drain-Source Diode Forward Current	I <sub>s</sub>		-	-	19	A
Diode Forward Voltage	V <sub>SD</sub>	I <sub>s</sub> =19A, V <sub>GS</sub> =0V	-	0.9	1.5	V
Reverse Recovery Charge	Q <sub>rr</sub>	I <sub>s</sub> =19A	-	5.7	-	μC
Reverse Recovery Time	T <sub>rr</sub>	di/dt=100A/μs	-	370	-	ns

### NOTES :

1. Pulse width ≤ 300us, Duty cycle ≤ 2%
2. Essentially independent of operating temperature typical characteristics.
3. R<sub>θJA</sub> is the sum of the junction-to-case and case-to-ambient thermal resistance.
4. C<sub>o(er)</sub> is a capacitance that gives the same stored energy as C<sub>oss</sub> while V<sub>DS</sub> is rising from 0V to 80% V<sub>(BR)DSS</sub>
5. Guaranteed by design, not subject to production testing

TYPICAL CHARACTERISTIC CURVES

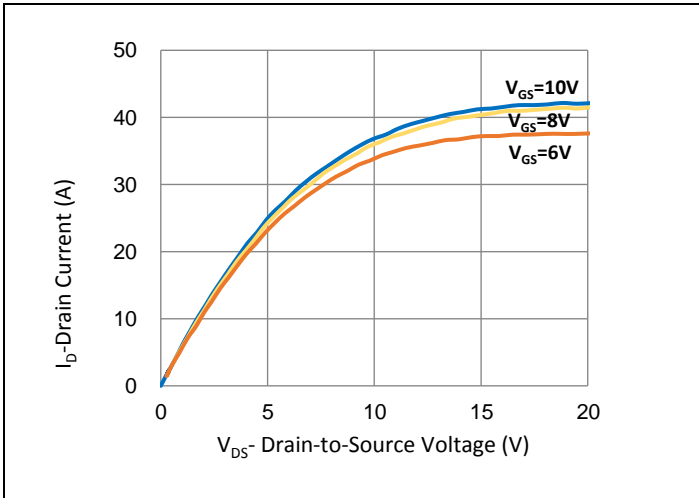


Fig.1 Output Characteristics

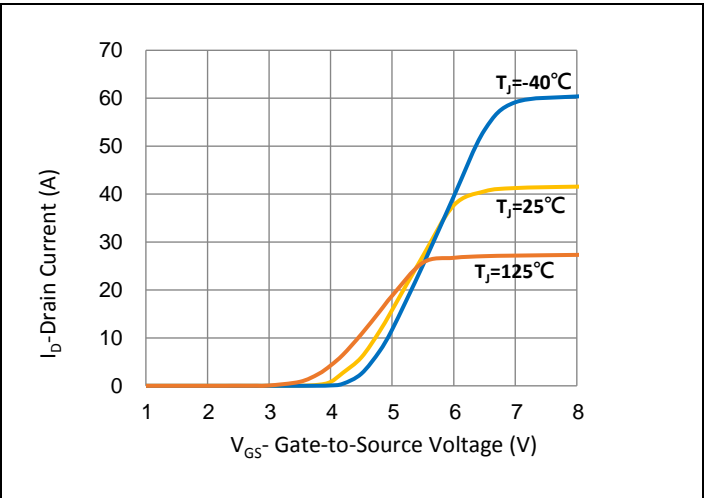


Fig.2 Transfer Characteristics

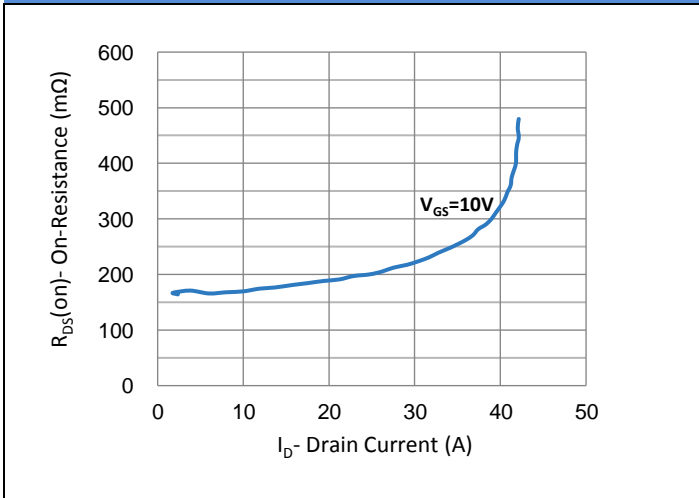


Fig.3 On-Resistance vs. Drain Current

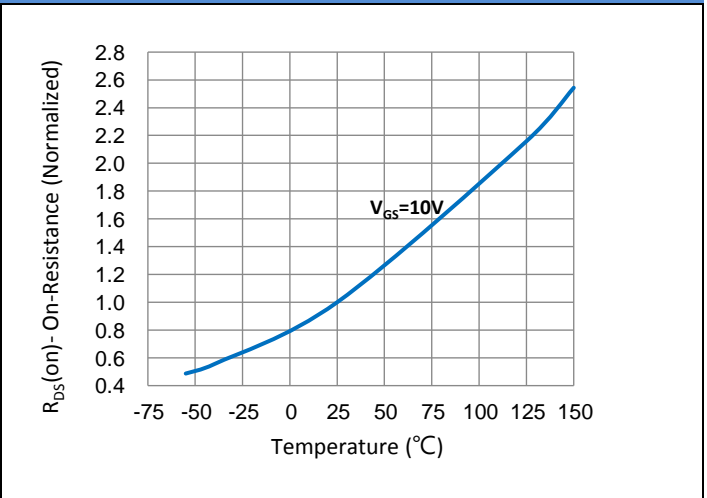


Fig.4 On-Resistance vs. Junction Temperature

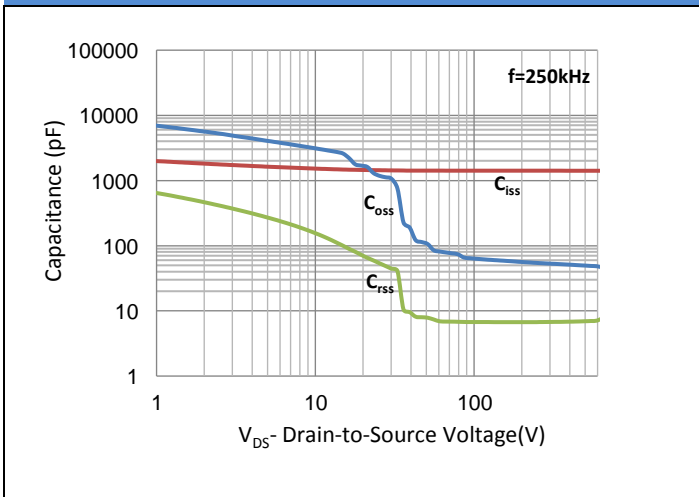


Fig.5 Capacitance vs. Drain-Source Voltage

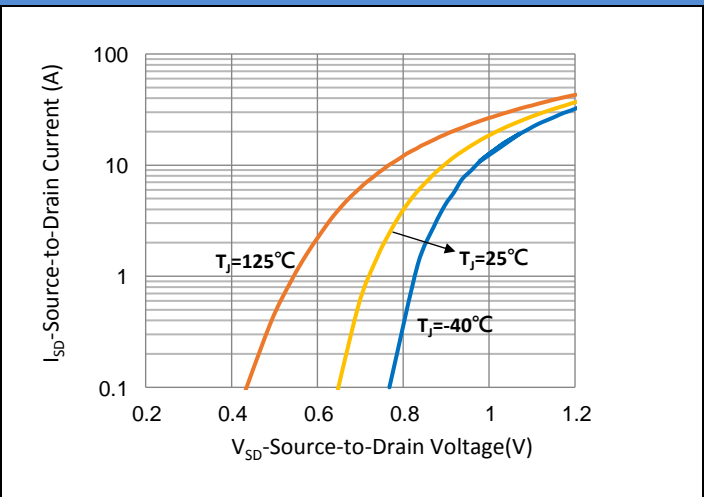


Fig.6 Source-Drain Diode Forward Voltage

TYPICAL CHARACTERISTIC CURVES

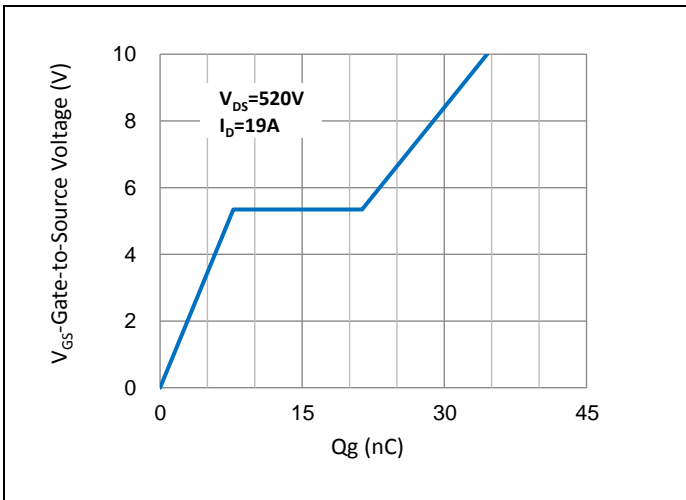


Fig.7 Gate-Charge Characteristics

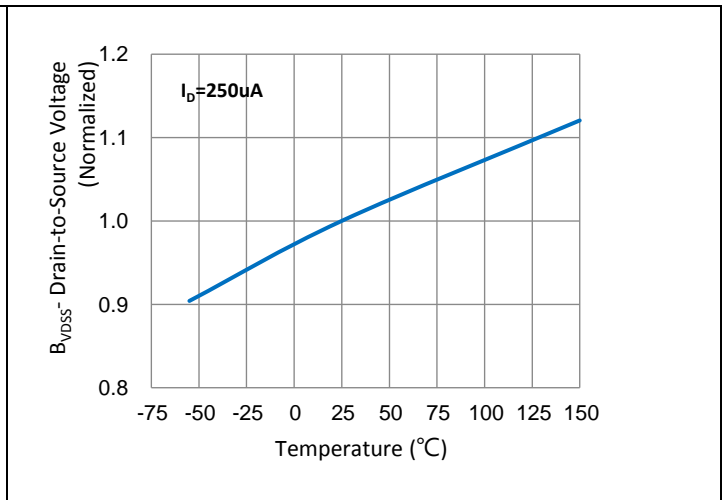


Fig.8 Breakdown Voltage Variation vs. Temperature

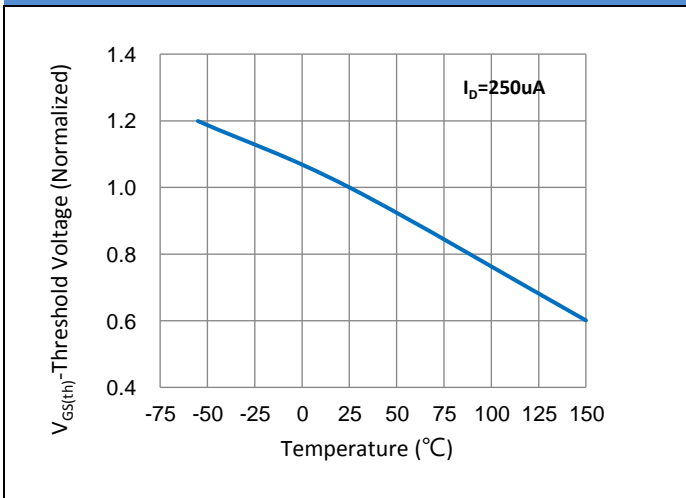


Fig.9 Threshold Voltage Variation with Temperature

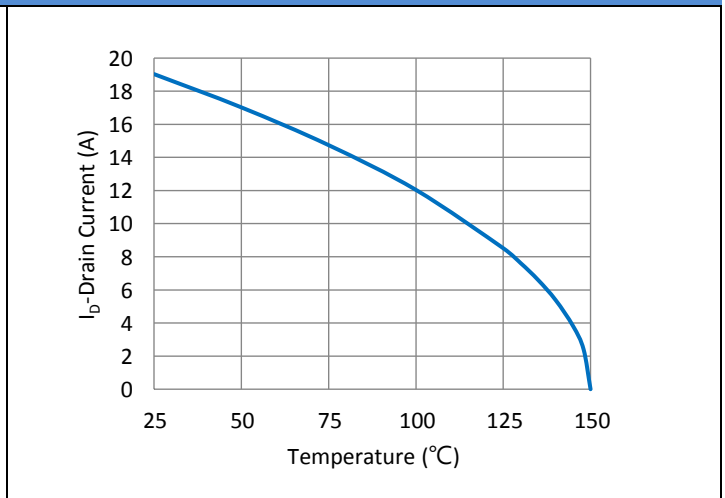


Fig.10 Drain Current vs. Case Temperature

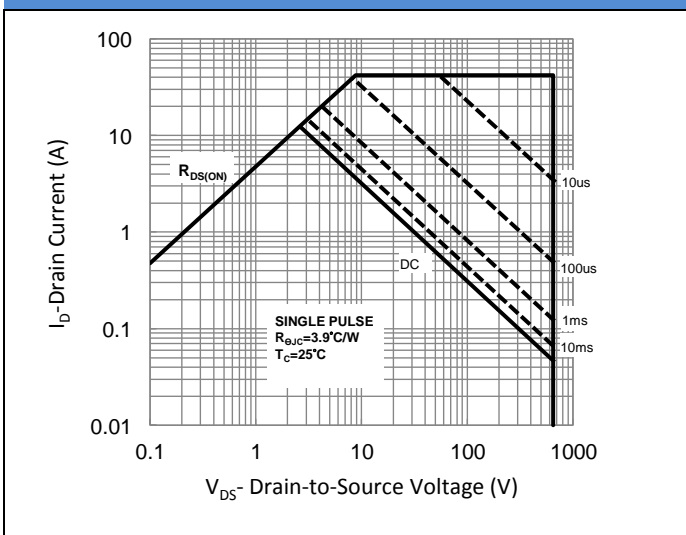


Fig.11 Maximum Safe Operating Area

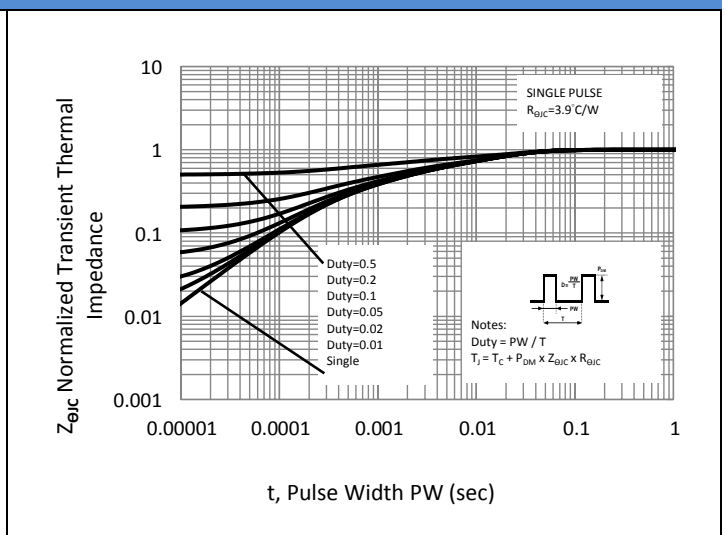


Fig.12 Normalized Transient Thermal Impedance

TYPICAL CHARACTERISTIC CURVES

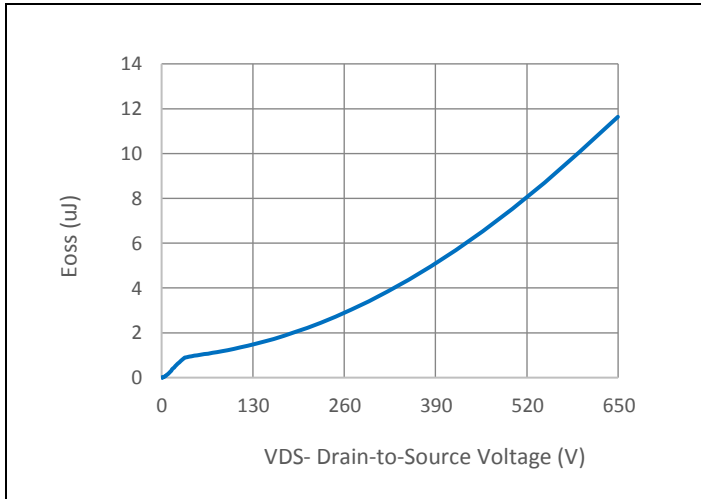
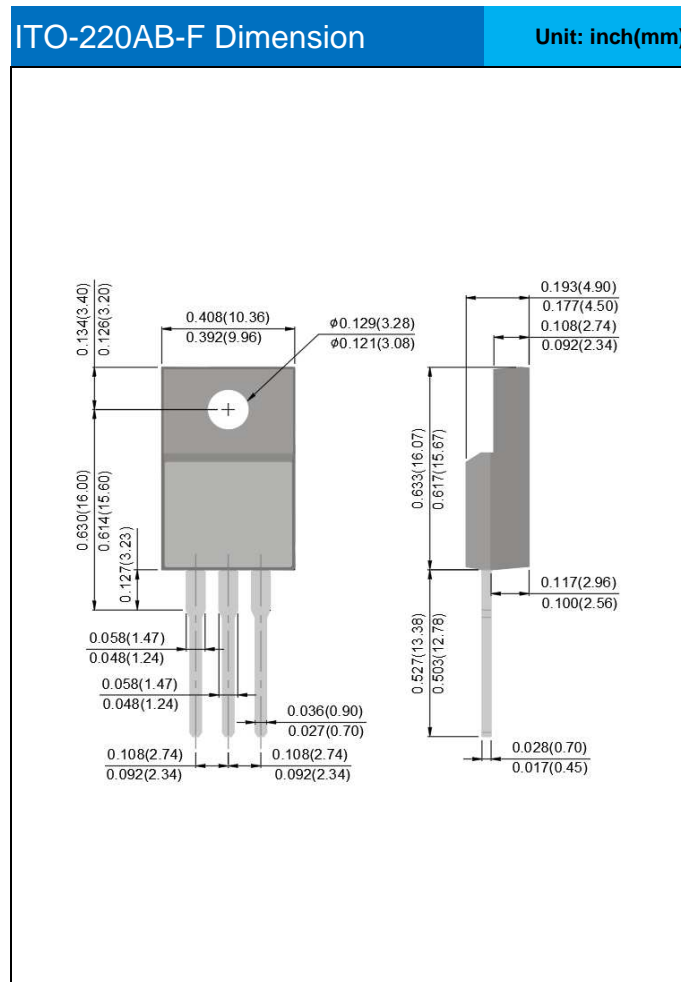


Fig.13 Typ. Coss Stored Energy

**Product and Packing Information**

Part No.	Package Type	Packing Type	Marking
PJMF210N65EC	ITO-220AB-F	50pcs / Tube	210N65EC

**Packaging Information**



**Marking Diagram**

PJ  
210N65EC  
YWLL x

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

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