

## 600V N-Channel Super Junction MOSFET

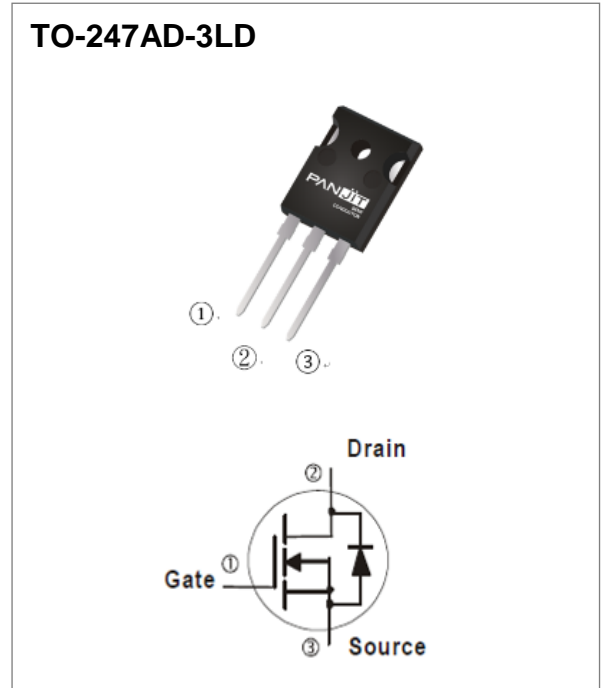
<b>Voltage</b>	<b>600 V</b>	<b>Rdson</b>	<b>99 mΩ</b>
<b>Current</b>	<b>39 A</b>	<b>Qg</b>	<b>60 nC</b>

### Feature:

- $R_{DS(ON) Max, V_{GS}@10V}$ : 99mΩ
- 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: TO-247AD-3LD package
- Terminals: Solderable per MIL-STD-750, Method 2026
- Approx. Weight: 6.231 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 @ $T_{jmax}$		$V_{DS}$	650	V
Drain-Source Voltage		$V_{DS}$	600	
Gate-Source Voltage		$V_{GS}$	$\pm 30$	
Continuous Drain Current	$T_C=25^\circ\text{C}$	$I_D$	39	A
	$T_C=100^\circ\text{C}$		24	
Pulsed Drain Current		$I_{DM}$	88	A
Single Pulse Avalanche Energy		$E_{AS}$	738	mJ
MOSFET dv/dt ruggedness		dv/dt	50	V/ns
Power Dissipation	$T_C=25^\circ\text{C}$	$P_D$	308	W
	$T_C=100^\circ\text{C}$		123	
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	$R_{\theta JC}$	0.41	$^\circ\text{C/W}$
	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	600	710	-	V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA	2.0	3.0	4.0	
Drain-Source On-State Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =19.5A <sup>(Note1)</sup>	-	84	99	mΩ
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =600V, 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> =19.5A	-	35	-	S
<b>Dynamic</b> <sup>(Note 5)</sup>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =480V, I <sub>D</sub> =19.5A, V <sub>GS</sub> =10V	-	60	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	13	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	23	-	
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =400V, V <sub>GS</sub> =0V, f=250kHz	-	2568	-	pF
Output Capacitance	C <sub>oss</sub>		-	58	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	1.9	-	
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>	-	99	-	
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =300V, I <sub>D</sub> =19.5A, V <sub>GS</sub> =10V, R <sub>G</sub> =25Ω <sup>(Note 2)</sup>	-	50	-	ns
Turn-On Rise Time	t <sub>r</sub>		-	81	-	
Turn-Off Delay Time	t <sub>d(off)</sub>		-	210	-	
Turn-Off Fall Time	t <sub>f</sub>		-	88	-	
Gate Resistance	R <sub>g</sub>	f=1.0MHz	-	2.1	-	Ω
<b>Drain-Source Diode</b>						
Maximum Continuous Drain-Source Diode Forward Current	I <sub>S</sub>		-	-	39	A
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =19.5A, V <sub>GS</sub> =0V	-	0.85	1.5	V
Reverse Recovery Charge	Q <sub>rr</sub>	I <sub>S</sub> =19.5A	-	6.7	-	μC
Reverse Recovery Time	T <sub>rr</sub>	di/dt=100A/μs	-	430	-	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

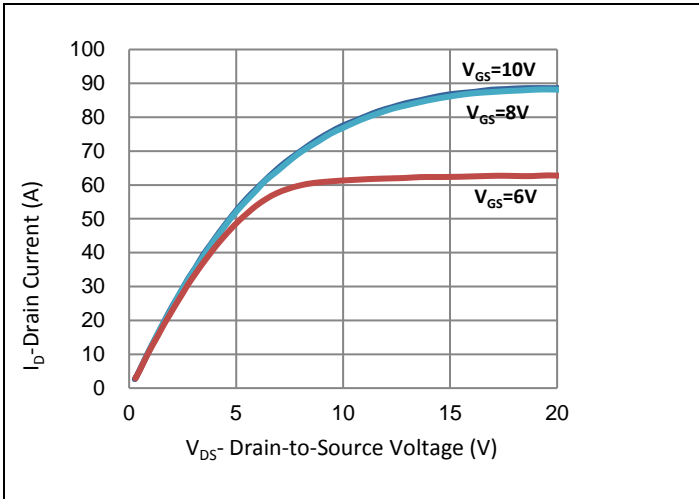


Fig.1 Output Characteristics

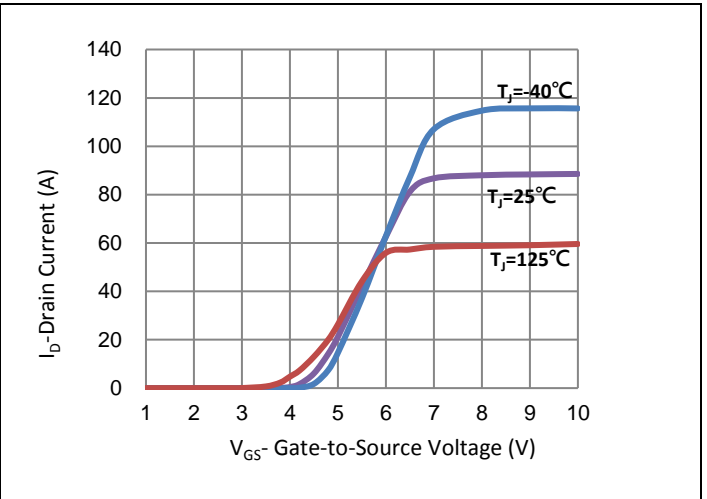


Fig.2 Transfer Characteristics

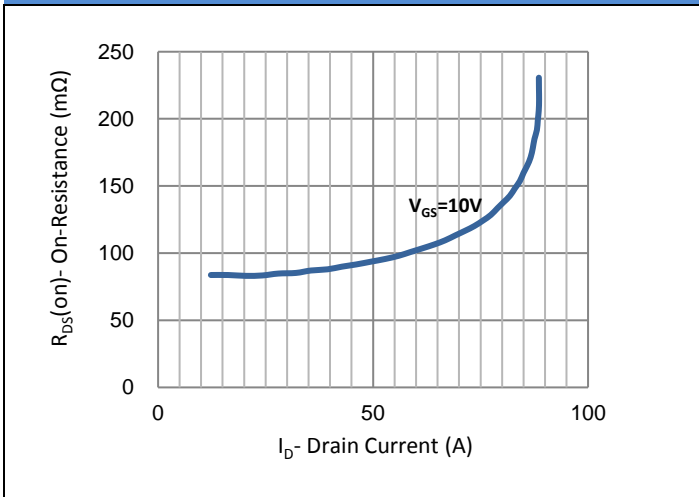


Fig.3 On-Resistance vs. Drain Current

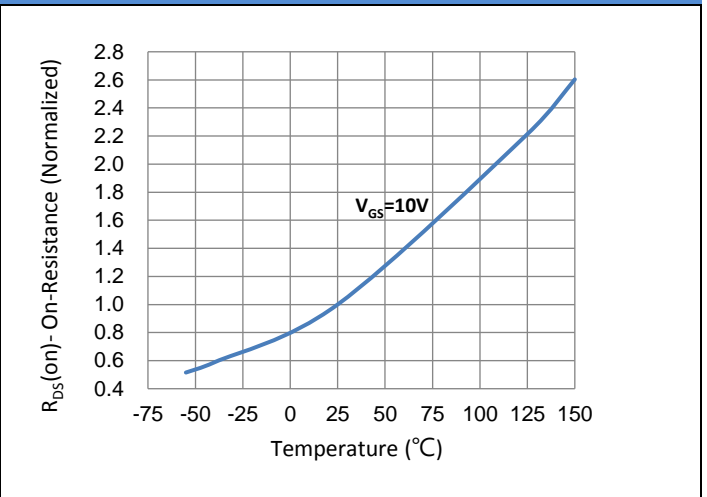


Fig.4 On-Resistance vs. Junction Temperature

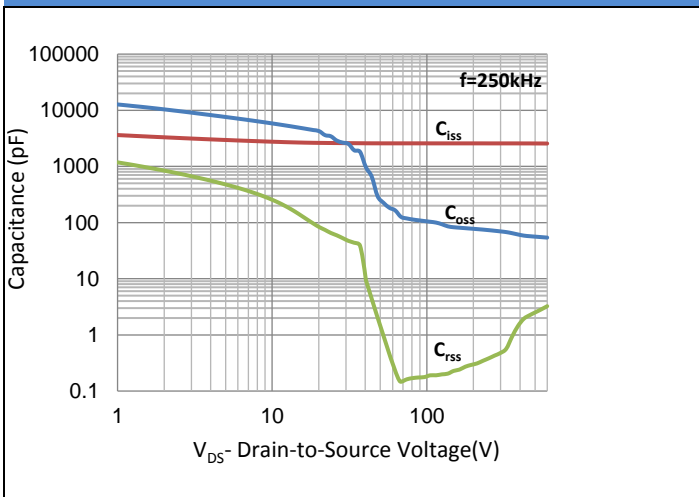


Fig.5 Capacitance vs. Drain-Source Voltage

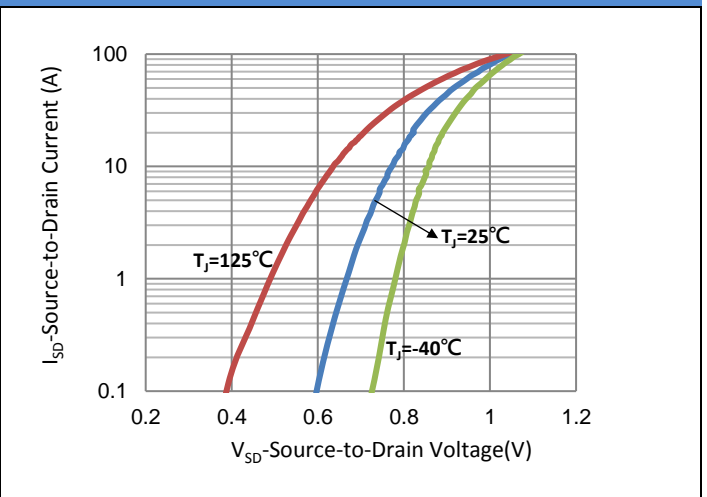
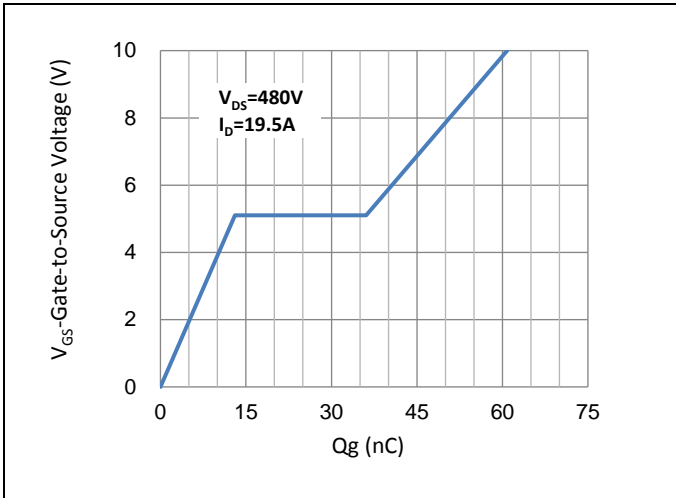
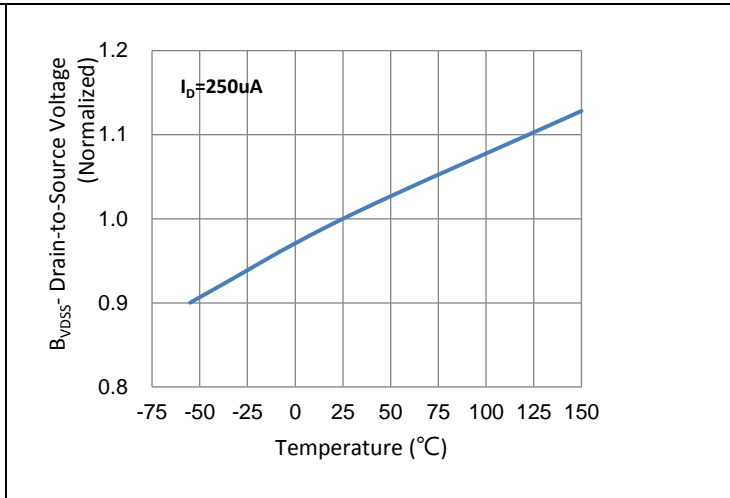


Fig.6 Source-Drain Diode Forward Voltage

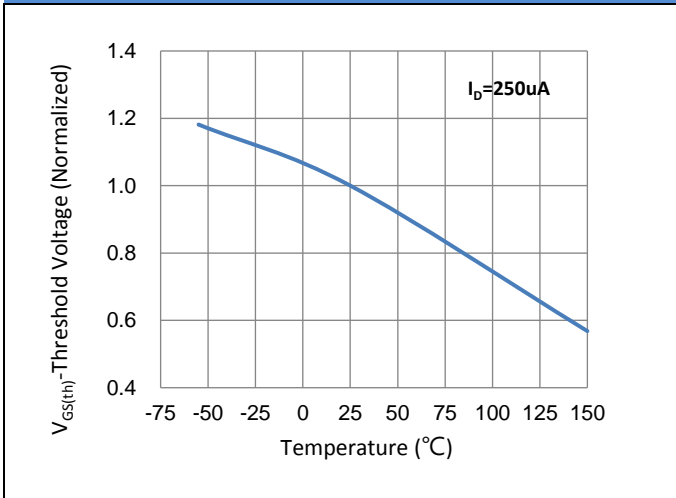
**TYPICAL CHARACTERISTIC CURVES**



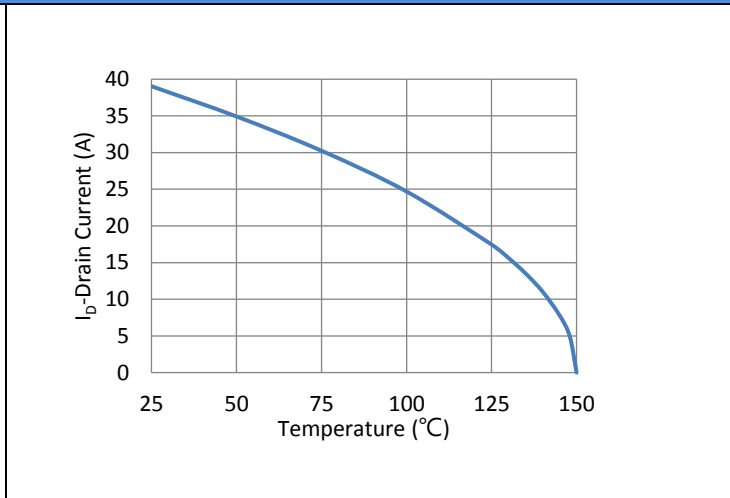
**Fig.7 Gate-Charge Characteristics**



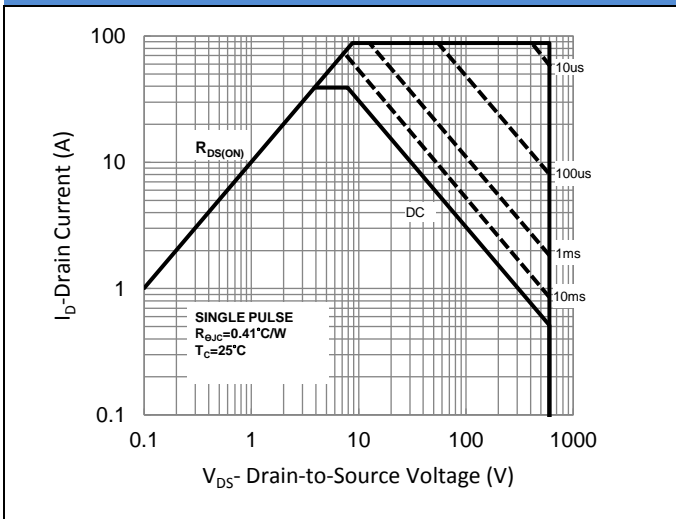
**Fig.8 Breakdown Voltage Variation vs. Temperature**



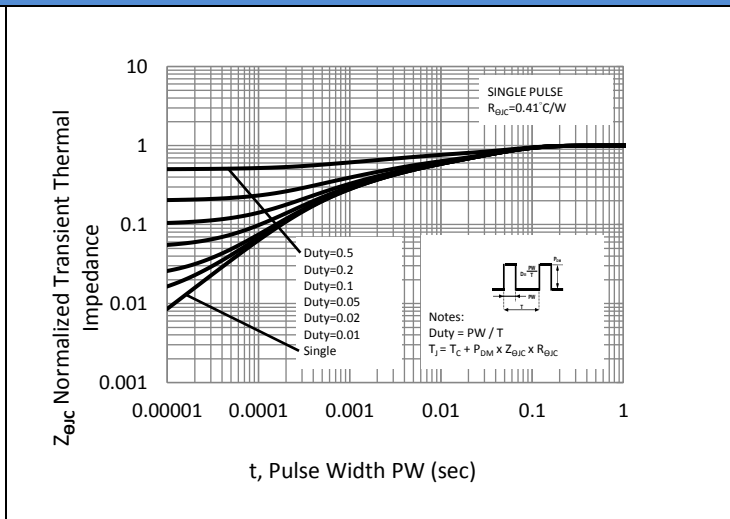
**Fig.9 Threshold Voltage Variation with Temperature**



**Fig.10 Drain Current vs. Case Temperature**



**Fig.11 Maximum Safe Operating Area**



**Fig.12 Normalized Transient Thermal Impedance**

TYPICAL CHARACTERISTIC CURVES

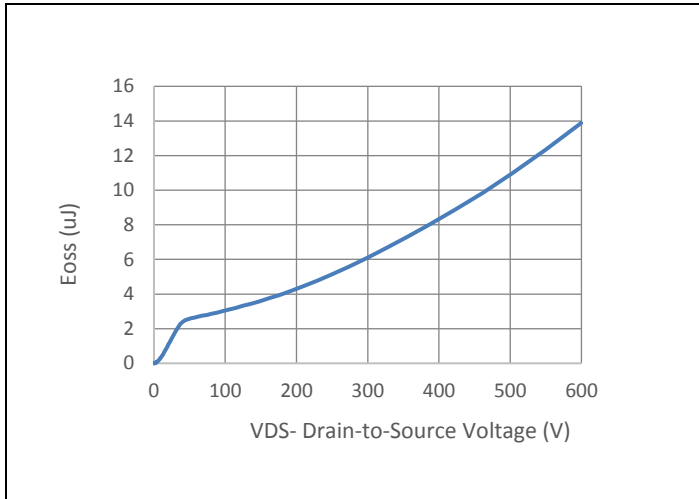
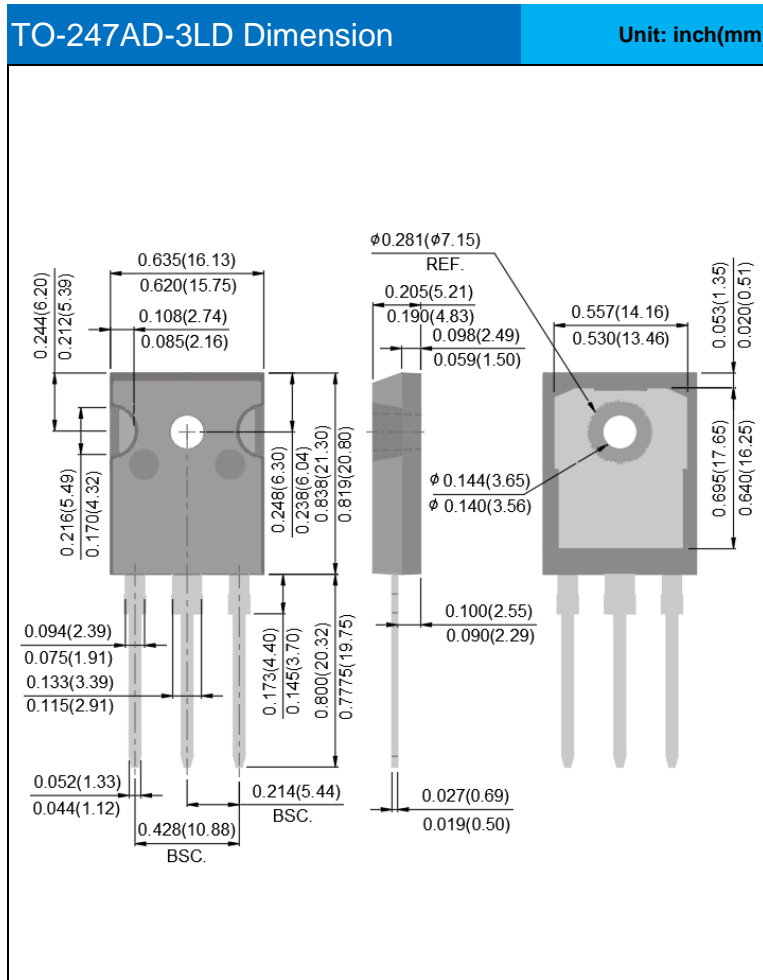


Fig.13 Typ. Coss Stored Energy

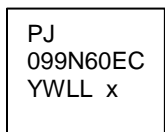
**Product and Packing Information**

Part No.	Package Type	Packing Type	Marking
PJM099N60EC	TO-247AD-3LD	30pcs / Tube	099N60EC

**Packaging Information**



**Marking Diagram**



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

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