

## 100V N-Channel Enhancement Mode MOSFET

<b>Voltage</b>	<b>100 V</b>	<b><math>R_{DS(ON),max}</math></b>	<b>&lt; 5.0 m<math>\Omega</math></b>
<b>Current</b>	<b>120 A</b>	<b><math>Q_G</math> (TYP)</b>	<b>40.5 nC</b>

### Feature

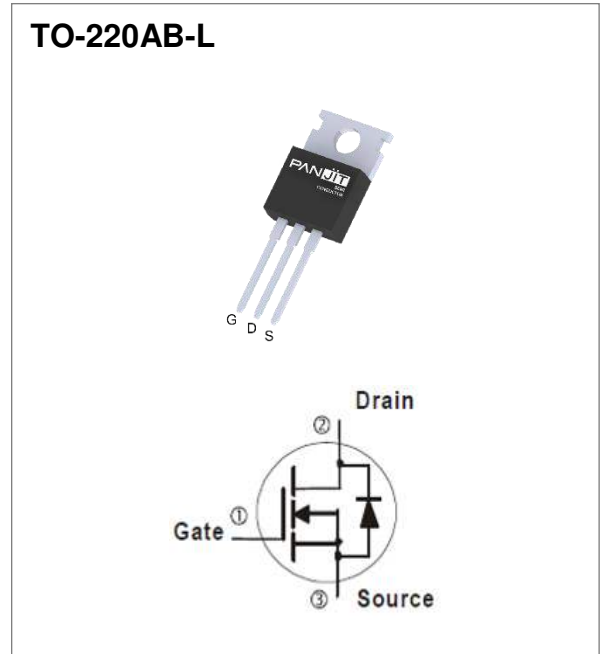
- $R_{DS(ON),max}$  < 5.0 m $\Omega$  at  $V_{GS} = 10$  V,  $I_D = 50$  A
- $R_{DS(ON),max}$  < 7.0 m $\Omega$  at  $V_{GS} = 6$  V,  $I_D = 25$  A
- High switching speed
- Low reverse transfer capacitance
- Lead free in compliance with EU RoHS 2.0
- Green molding compound as per IEC 61249 standard

### Mechanical Data

- Case: TO-220AB-L package
- Terminals: Solderable per MIL-STD-750, Method 2026
- Approx. Weight: 2.0948 grams

### Application

- SR solutions of Power supply, BMS, BLDC motor driver switch



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

PARAMETER		SYMBOL	LIMIT	UNITS
Drain-Source Voltage		$V_{DS}$	100	V
Gate-Source Voltage		$V_{GS}$	$\pm 20$	
Continuous Drain Current (Note 3)	$T_C = 25$ °C	$I_D$	120	A
	$T_C = 100$ °C		76	
Pulsed Drain Current (Note 6)		$I_{DM}$	480	A
Single Pulse Avalanche Current (Note 5)		$I_{AS}$	50	A
Single Pulse Avalanche Energy (Note 5)		$E_{AS}$	318	mJ
Power Dissipation	$T_C = 25$ °C	$P_D$	138	W
	$T_C = 100$ °C		55	
Operating Junction and Storage Temperature Range		$T_J, T_{STG}$	-55~150	°C

### Thermal Characteristics

PARAMETER		SYMBOL	MAXIMUM	UNITS
Thermal Resistance	Junction-to-Case (Bottom)	$R_{\theta JC}$	0.9	°C/W
	Junction-to-Ambient (Note.4)	$R_{\theta JA}$	60	°C/W

**Electrical Characteristics** ( $T_A = 25\text{ }^\circ\text{C}$  unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNITS
<b>Static</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0\text{ V}, I_D=250\text{ }\mu\text{A}$	100	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=270\text{ }\mu\text{A}$	1.8	2.8	3.8	
Drain-Source On-State Resistance (Note 1)	$R_{DS(on)}$	$V_{GS}=10\text{ V}, I_D=50\text{ A}$	-	4.3	5.0	m $\Omega$
		$V_{GS}=6\text{ V}, I_D=25\text{ A}$	-	5.4	7.0	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=100\text{ V}, V_{GS}=0\text{ V}$	-	-	1	$\mu\text{A}$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20\text{ V}, V_{DS}=0\text{ V}$	-	-	$\pm 100$	nA
Transfer characteristics (Note 1)	$g_{fs}$	$V_{DS}=10\text{ V}, I_D=50\text{ A}$	-	100	-	S
Gate Resistance	$R_g$	$f = 1.0\text{ MHz}$	-	0.8	1.6	$\Omega$
<b>Dynamic</b> (Note 6)						
Total Gate Charge	$Q_g$	$V_{DS}=50\text{ V}, I_D=50\text{ A},$ $V_{GS}=10\text{ V}$	-	40.5	53	nC
Gate-Source Charge	$Q_{gs}$		-	15	-	
Gate-Drain Charge	$Q_{gd}$		-	6	-	
Gate Plateau Voltage	$V_{plateau}$		-	5	-	V
Input Capacitance	$C_{iss}$	$V_{DS}=50\text{ V}, V_{GS}=0\text{ V},$ $f=250\text{ kHz}$	-	3010	3910	pF
Output Capacitance	$C_{oss}$		-	1080	1400	
Reverse Transfer Capacitance	$C_{rss}$		-	14	-	
Output Charge	$Q_{oss}$	$V_{DS}=50\text{ V}, V_{GS}=0\text{ V}$	-	85	110	nC
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=50\text{ V}, I_D=50\text{ A},$ $V_{GS}=10\text{ V}, R_G=3.0\text{ }\Omega$ (Note 2)	-	16	-	ns
Rise Time	$t_r$		-	6	-	
Turn-Off Delay Time	$t_{d(off)}$		-	26	-	
Fall Time	$t_f$		-	6	-	
<b>Drain-Source Diode</b>						
Diode Forward Voltage	$V_{SD}$	$I_S=50\text{ A}, V_{GS}=0\text{ V}$	-	0.9	1.2	V
Reverse Recovery Charge (Note 6)	$Q_{rr}$	$I_F=50\text{ A}, V_{DD}=50\text{ V}$ $di/dt=100\text{ A}/\mu\text{s}$	-	85	170	nC
Reverse Recovery Time (Note 6)	$T_{rr}$		-	56	112	ns

NOTES :

1. Pulse width  $\leq 300\text{ }\mu\text{s}$ , Duty cycle  $\leq 2\%$
2. Essentially independent of operating temperature typical characteristics.
3. The maximum drain current calculated by maximum junction temperature and thermal impedance. It can be varied by application and environment.
4.  $R_{\theta JA}$  is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. Mounted on a 1 inch<sup>2</sup> with 2oz.square pad of copper.
5.  $E_{AS}$  is calculated based on the condition of  $L = 1.0\text{ mH}$ ,  $I_{AS} = 25.2\text{ A}$ ,  $V_{DD} = 50\text{ V}$ ,  $V_{GS} = 10\text{ V}$ . 100% test at  $L = 0.1\text{ mH}$ ,  $I_{AS} = 50\text{ A}$  in production.
6. Guaranteed by design, not subject to production testing.

TYPICAL CHARACTERISTIC CURVES

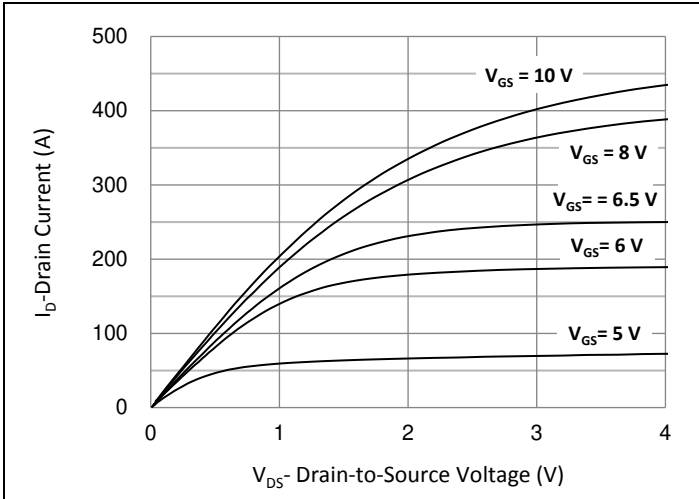


Fig.1 Output Characteristics

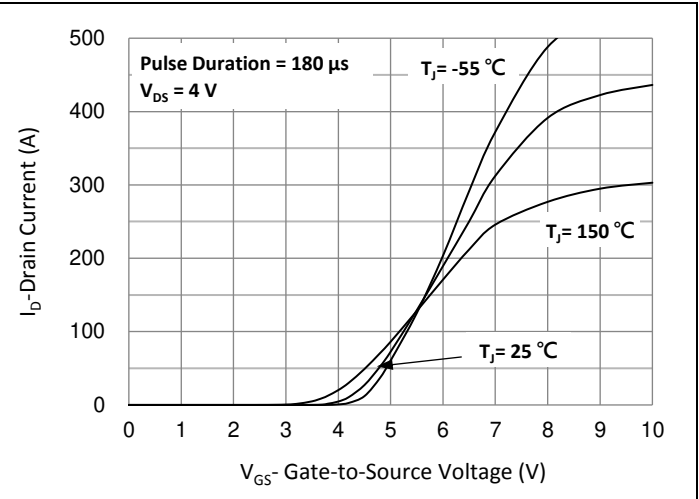


Fig.2 Transfer Characteristics

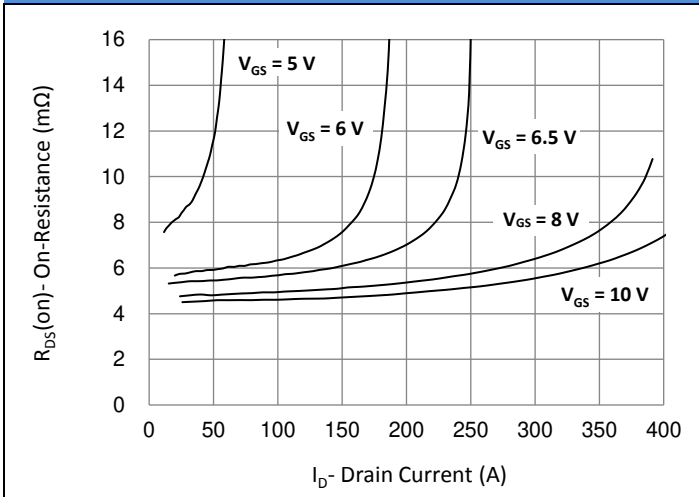


Fig.3 On-Resistance vs. Drain Current

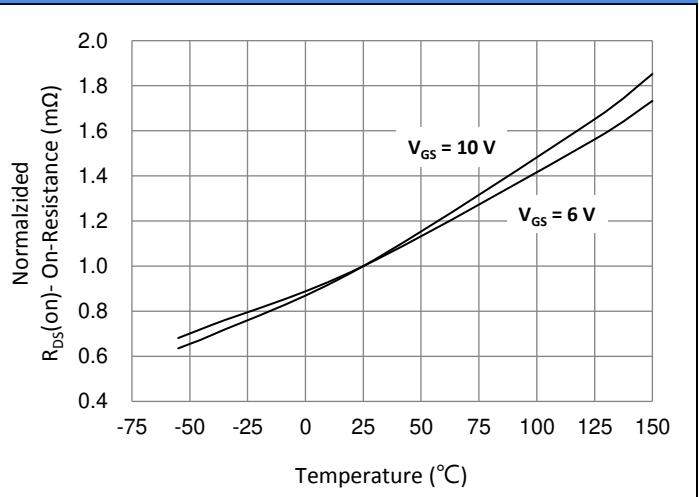


Fig.4 On-Resistance vs. Junction temperature

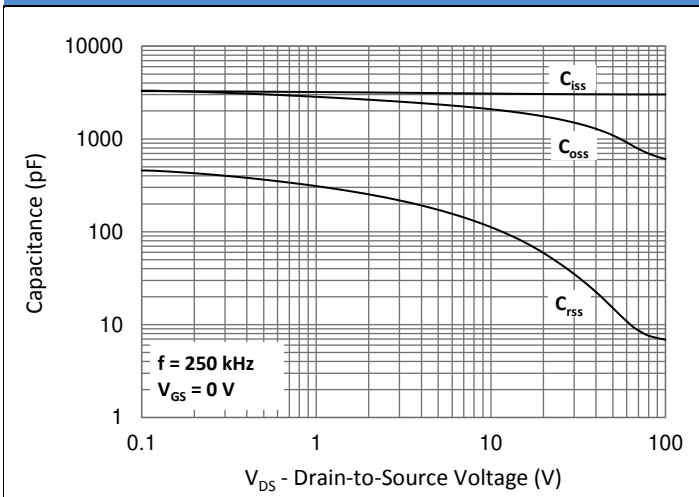


Fig.5 Capacitance vs. Drain-Source Voltage

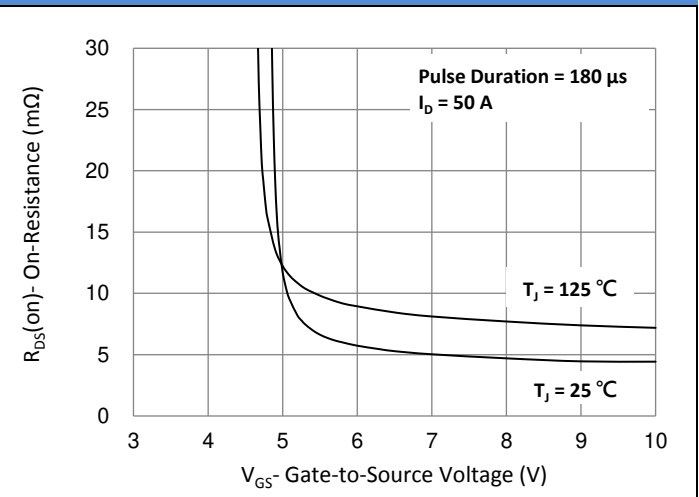


Fig.6 On-Resistance vs. Gate-Source Voltage

TYPICAL CHARACTERISTIC CURVES

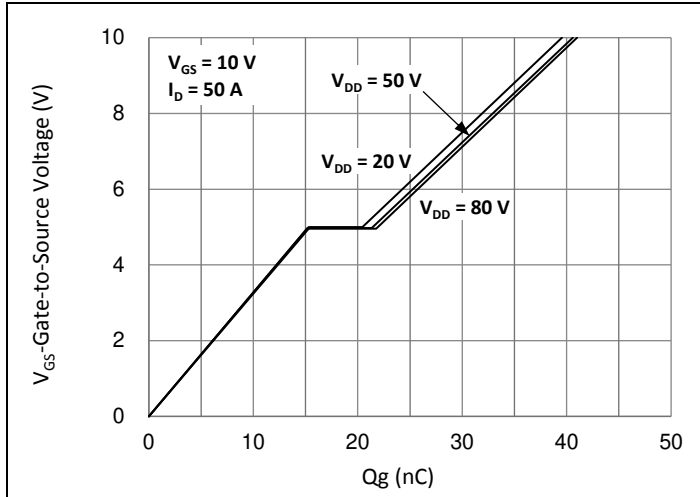


Fig.7 Gate-Charge Characteristics

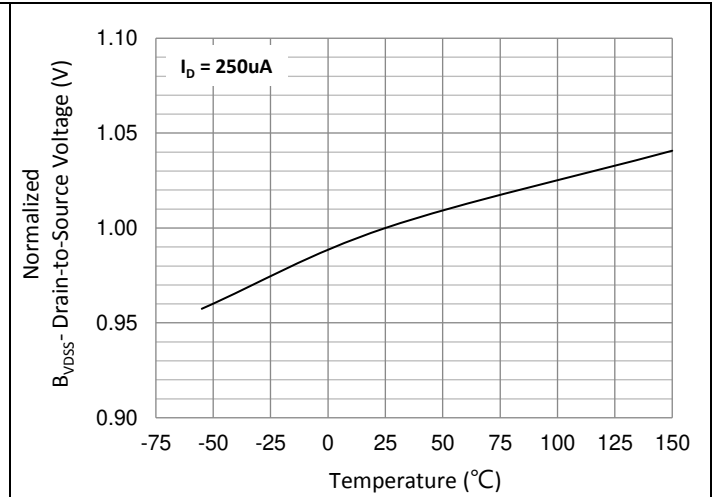


Fig.8 Breakdown Voltage Variation vs. Temperature

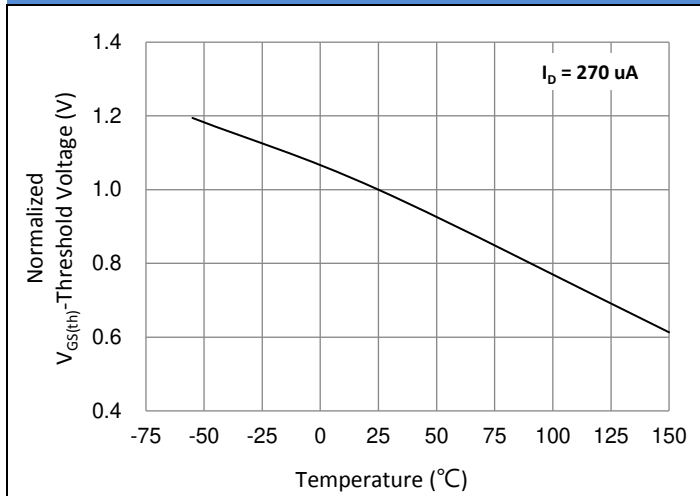


Fig.9 Threshold Voltage Variation with Temperature

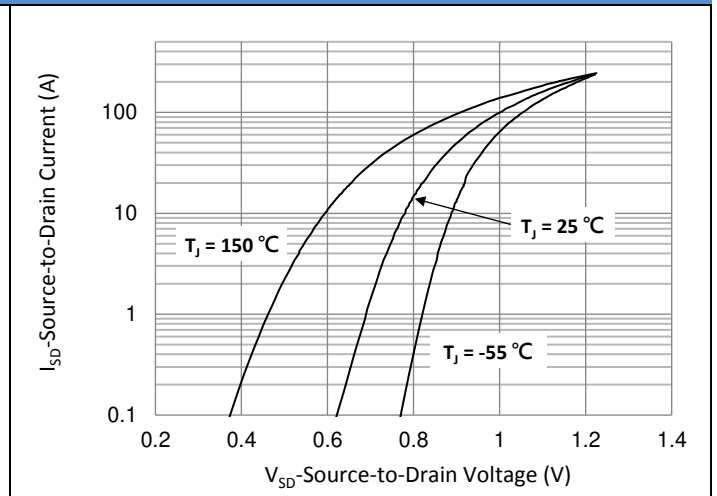


Fig.10 Source-Drain Diode Forward Voltage

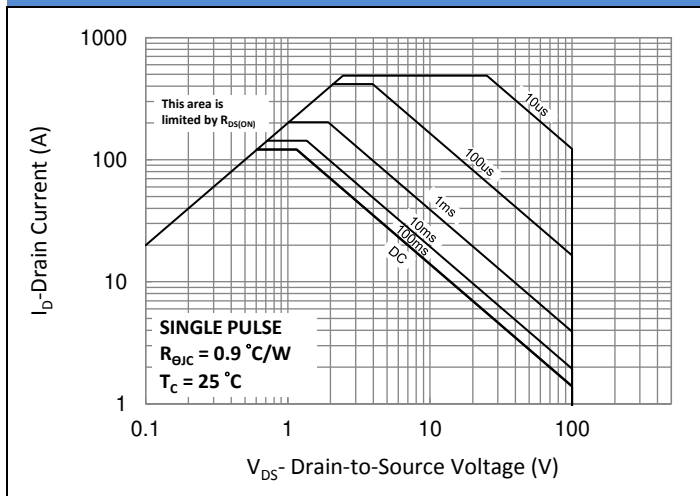


Fig.11 Maximum Safe Operating Area

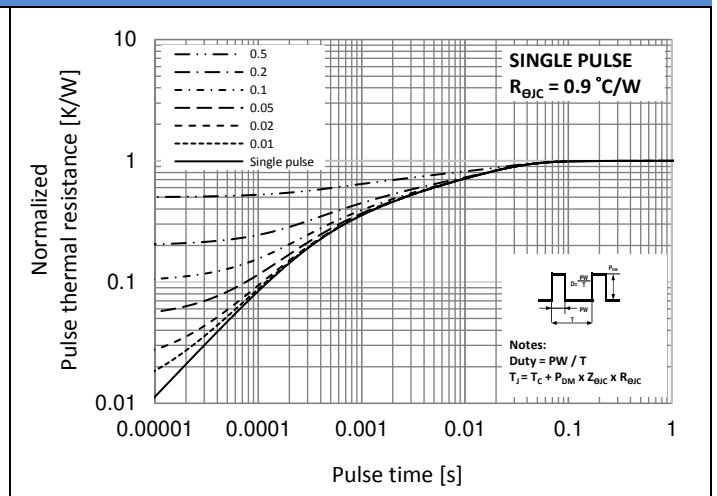


Fig.12 Normalized Transient Thermal Impedance

TYPICAL CHARACTERISTIC CURVES

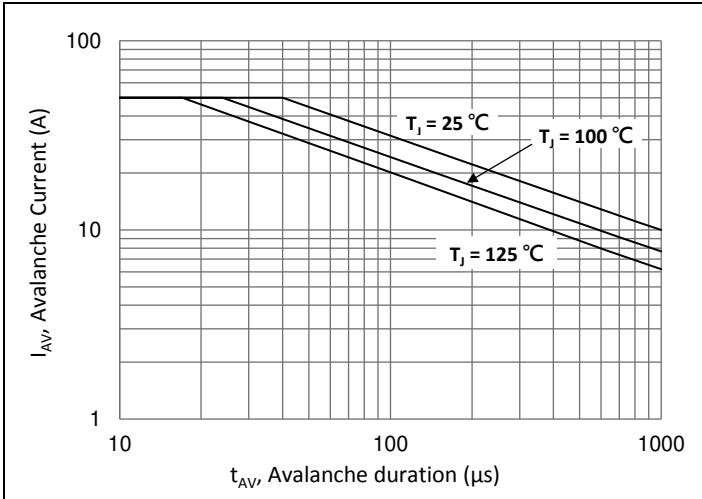


Fig.13 Avalanche Characteristics

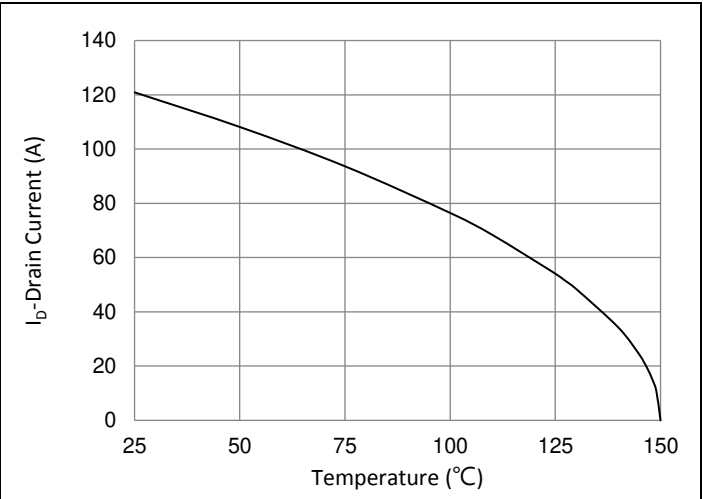
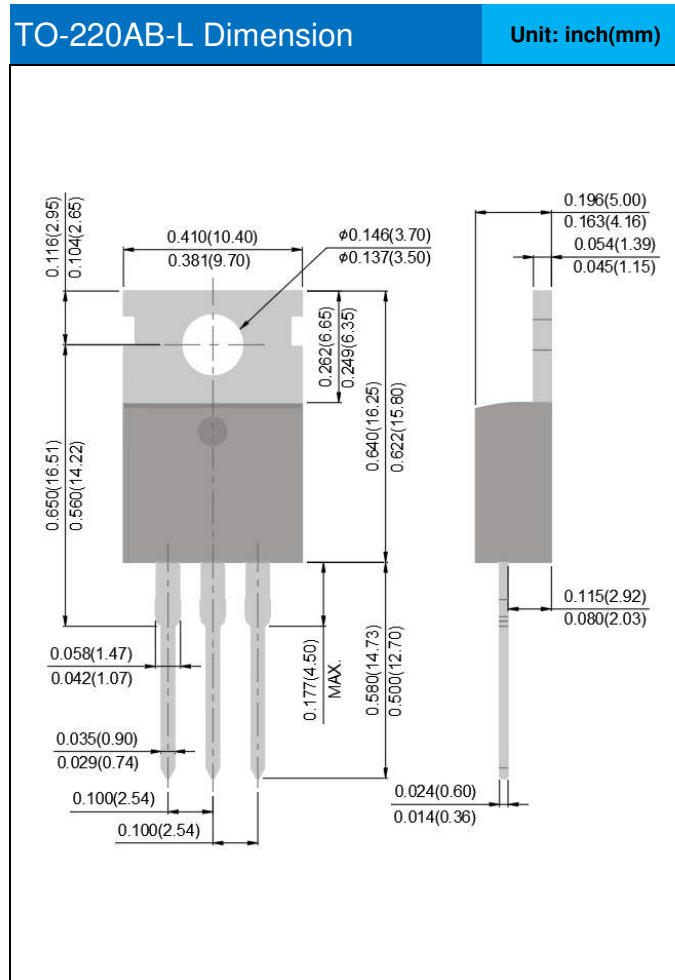


Fig.14 Drain Current vs. Case Temperature

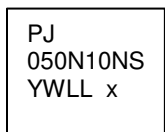
**Product and Packing Information**

Part No.	Package Type	Packing Type	Marking
PSMP050N10NS2	TO-220AB-L	50pcs / Tube	050N10NS

**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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