

HY70R102U-VB Datasheet

Power MOSFET

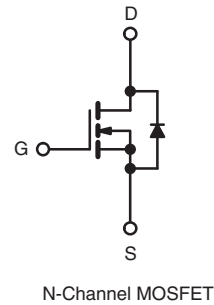
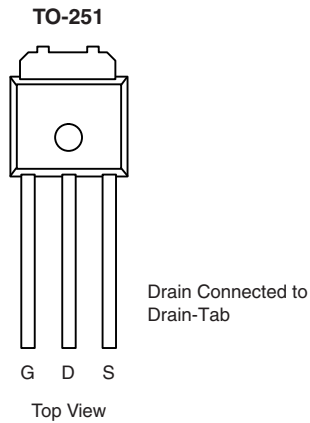
PRODUCT SUMMARY		
V_{DS} (V)	700	
$R_{DS(on)}$ (Ω)	$V_{GS} = 10\text{ V}$	1.9
Q_g (Max.) (nC)	130	
Q_{gs} (nC)	17	
Q_{gd} (nC)	72	
Configuration	Single	

FEATURES

- Dynamic dV/dt rating
- Repetitive avalanche rated
- Isolated central mounting hole
- Fast switching
- Ease of paralleling
- Simple drive requirements



RoHS
COMPLIANT



ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted)					
PARAMETER			SYMBOL	LIMIT	UNIT
Drain-Source Voltage			V _{DS}	700	V
Gate-Source Voltage			V _{GS}	± 20	
Continuous Drain Current	V _{GS} at 10 V	T _C = 25 °C	I _D	6.0	A
		T _C = 100 °C		4.2	
Pulsed Drain Current ^a			I _{DM}	24	
Linear Derating Factor				1.2	W/°C
Single Pulse Avalanche Energy ^b			E _{AS}	490	mJ
Repetitive Avalanche Current ^a			I _{AR}	5.4	A
Repetitive Avalanche Energy ^a			E _{AR}	15	mJ
Maximum Power Dissipation	T _C = 25 °C		P _D	150	W
Peak Diode Recovery dV/dt ^c			dV/dt	2.0	V/ns
Operating Junction and Storage Temperature Range			T _J , T _{stg}	-55 to +150	°C
Soldering Recommendations (Peak Temperature) ^d	for 10 s			300	
Mounting Torque	6-32 or M3 screw			10	lbf · in
				1.1	N · m

Notes

- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- $V_{DD} = 50\text{ V}$, starting $T_J = 25\text{ }^\circ\text{C}$, $L = 31\text{ mH}$, $R_g = 25\text{ }\Omega$, $I_{AS} = 5.4\text{ A}$ (see fig. 12).
- $I_{SD} \leq 5.4\text{ A}$, $dI/dt \leq 120\text{ A}/\mu\text{s}$, $V_{DD} \leq 600$, $T_J \leq 150\text{ }^\circ\text{C}$.
- 1.6 mm from case.

THERMAL RESISTANCE RATINGS

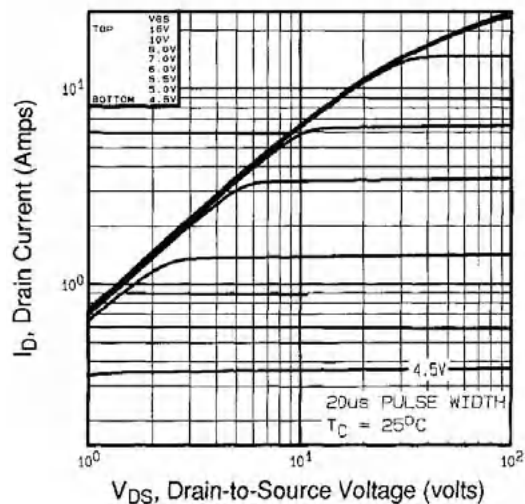
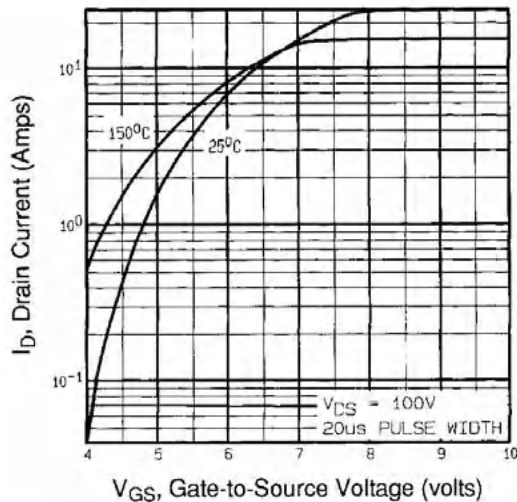
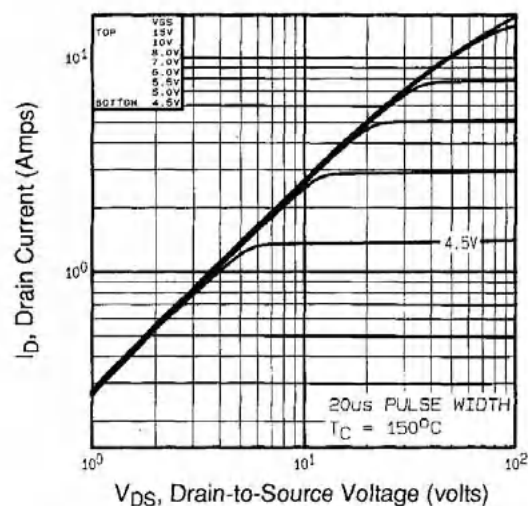
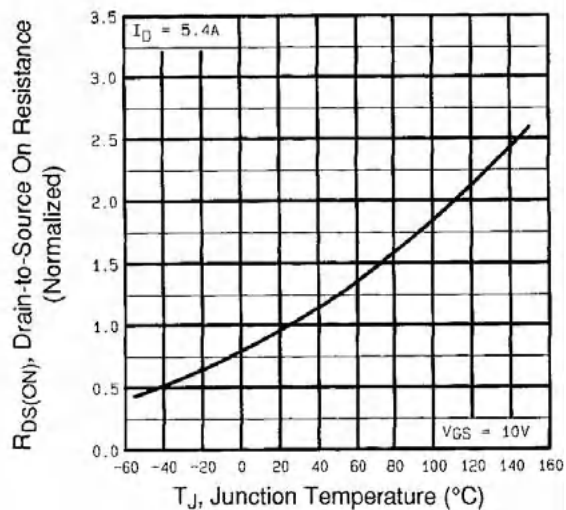
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	R_{thJA}	-	40	°C/W
Case-to-Sink, Flat, Greased Surface	R_{thCS}	0.24	-	
Maximum Junction-to-Case (Drain)	R_{thJC}	-	0.83	

SPECIFICATIONS ($T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA		700	-	-	V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	Reference to 25 °C, I _D = 1 mA		-	0.98	-	V/°C
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA		2.0	-	4.0	V
Gate-Source Leakage	I _{GSS}	V _{GS} = ± 20 V		-	-	± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 700 V, V _{GS} = 0 V		-	-	100	μA
		V _{DS} = 560 V, V _{GS} = 0 V, T _J = 125 °C		-	-	500	
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} = 10 V	I _D = 3.2 A ^b	–	1.9	-	Ω
Forward Transconductance	g _{fs}	V _{DS} = 100 V, I _D = 3.2 A ^b		3.0	-	-	S
Dynamic							
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1.0 MHz, see fig. 5		-	1900	-	pF
Output Capacitance	C _{oss}			-	470	-	
Reverse Transfer Capacitance	C _{rss}			-	280	-	
Total Gate Charge	Q _g	V _{GS} = 10 V	I _D = 5.4 A, V _{DS} = 350 V, see fig. 6 and 13 ^b	-	-	130	nC
Gate-Source Charge	Q _{gs}			-	-	17	
Gate-Drain Charge	Q _{gd}			-	-	72	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 350 V, I _D = 5.4 A, R _g = 9.1 Ω, R _D = 75 Ω, see fig. 10 ^b		-	16	-	ns
Rise Time	t _r			-	36	-	
Turn-Off Delay Time	t _{d(off)}			-	100	-	
Fall Time	t _f			-	32	-	
Internal Drain Inductance	L _D	Between lead, 6 mm (0.25") from package and center of die contact		-	5.0	-	nH
Internal Source Inductance	L _S			-	13	-	
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I _S	MOSFET symbol showing the integral reverse p - n junction diode		-	-	5.4	A
Pulsed Diode Forward Current ^a	I _{SM}			-	-	22	
Body Diode Voltage	V _{SD}	T _J = 25 °C, I _S = 5.4 A, V _{GS} = 0 V ^b		-	-	1.8	V
Body Diode Reverse Recovery Time	t _{rr}	T _J = 25 °C, I _F = 5.4 A, dI/dt = 100 A/μs ^b		-	550	830	ns
Body Diode Reverse Recovery Charge	Q _{rr}			-	2.4	3.6	μC
Forward Turn-On Time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by L _S and L _D)					

Notes

- a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
 b. Pulse width $\leq 300\text{ }\mu\text{s}$; duty cycle $\leq 2\%$.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Fig. 1 - Typical Output Characteristics, $T_C = 25^\circ\text{C}$

Fig. 3 - Typical Transfer Characteristics

Fig. 2 - Typical Output Characteristics, $T_C = 150^\circ\text{C}$

Fig. 4 - Normalized On-Resistance vs. Temperature

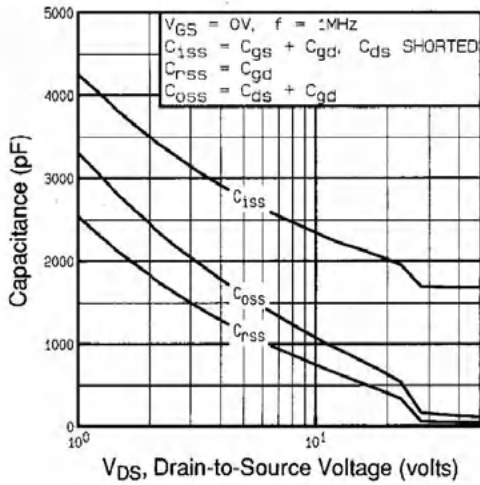


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

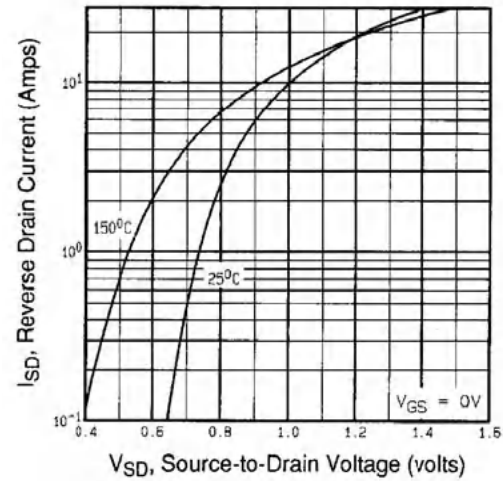


Fig. 7 - Typical Source-Drain Diode Forward Voltage

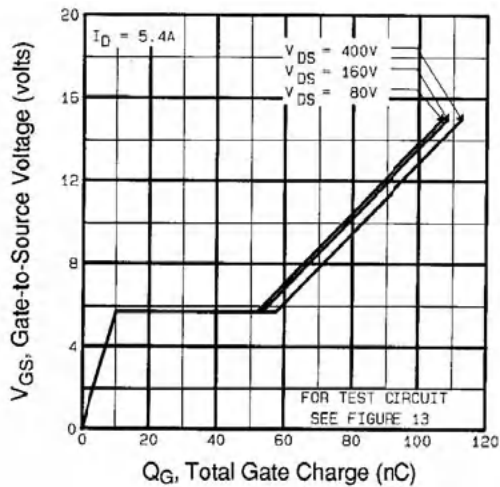


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

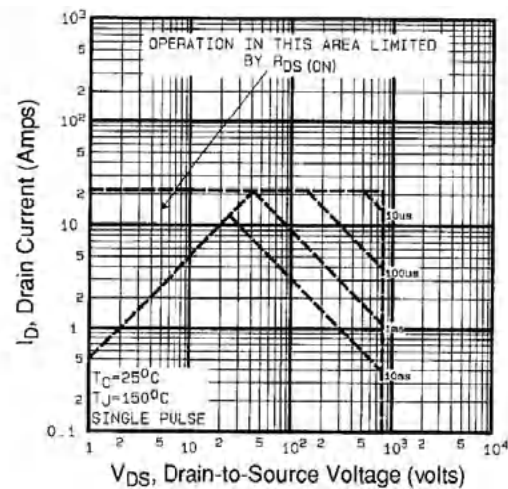


Fig. 8 - Maximum Safe Operating Area

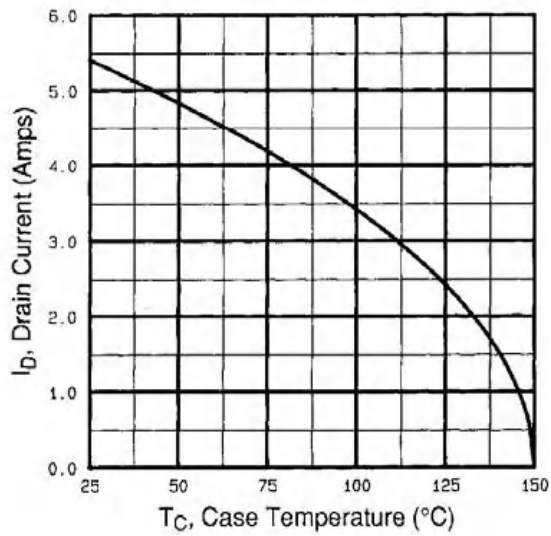


Fig. 9 - Maximum Drain Current vs. Case Temperature

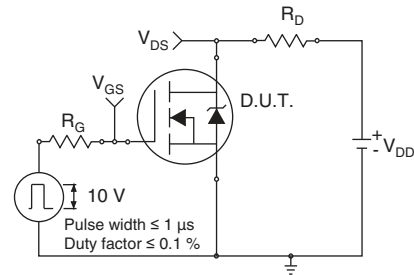


Fig. 10a - Switching Time Test Circuit

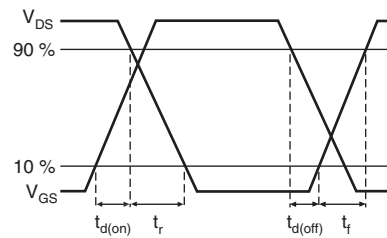


Fig. 10b - Switching Time Waveforms

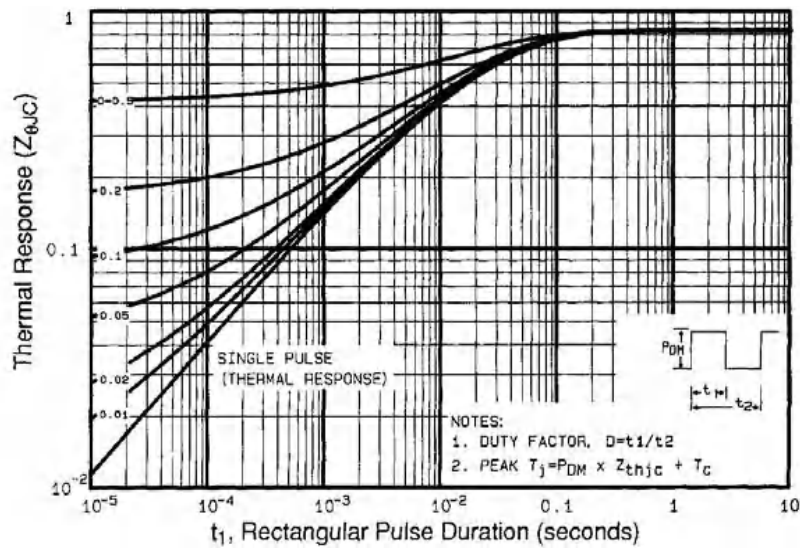


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

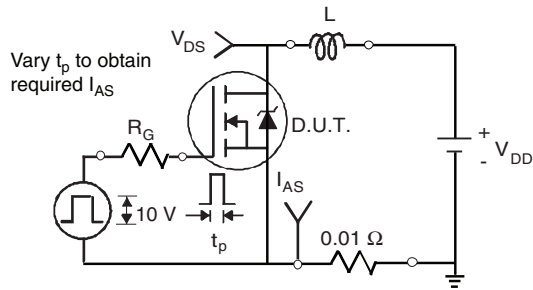


Fig. 12a - Unclamped Inductive Test Circuit

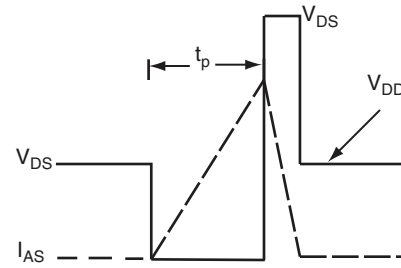


Fig. 12b - Unclamped Inductive Waveforms

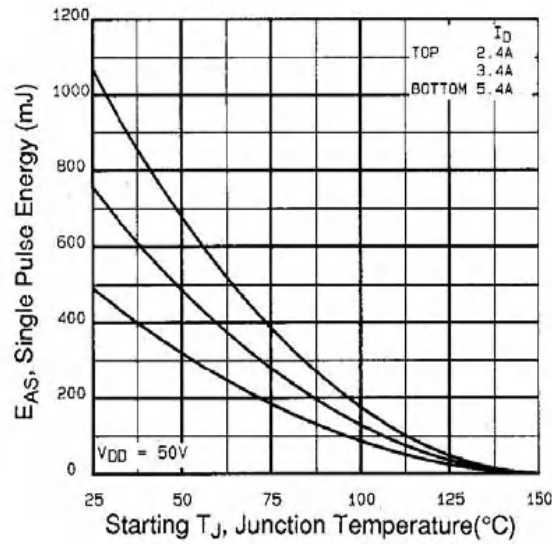


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

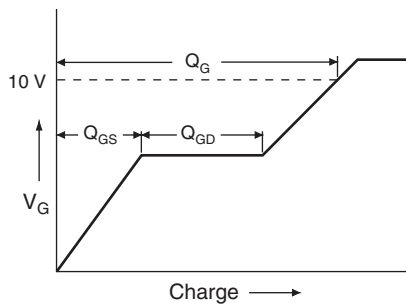


Fig. 13a - Basic Gate Charge Waveform

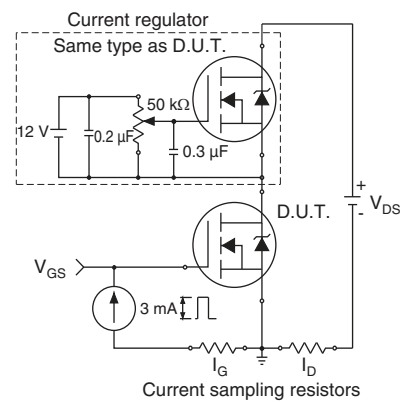
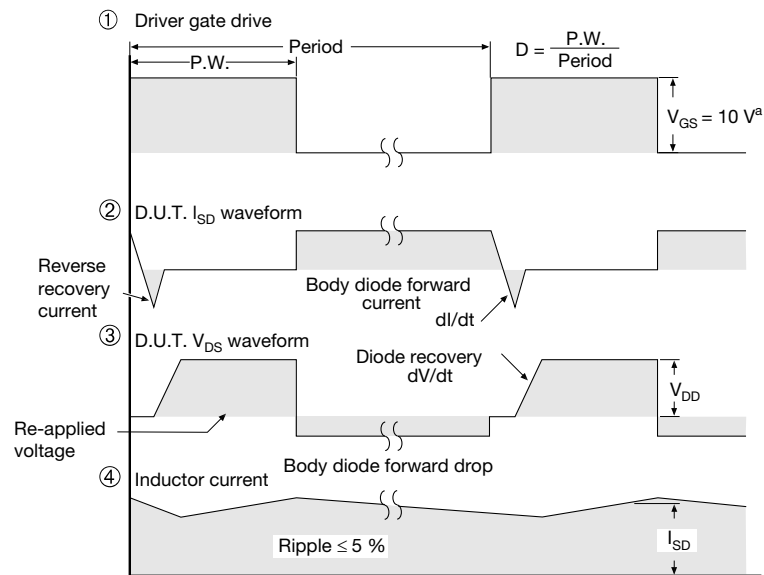
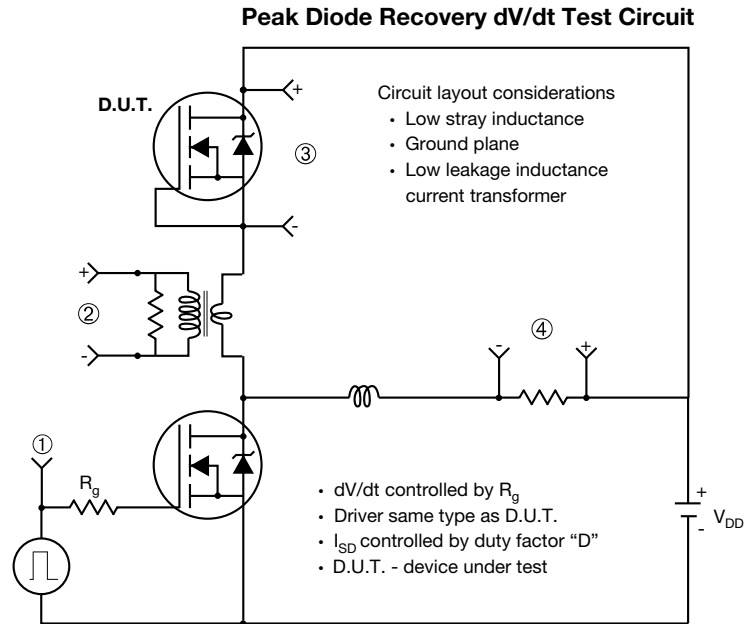


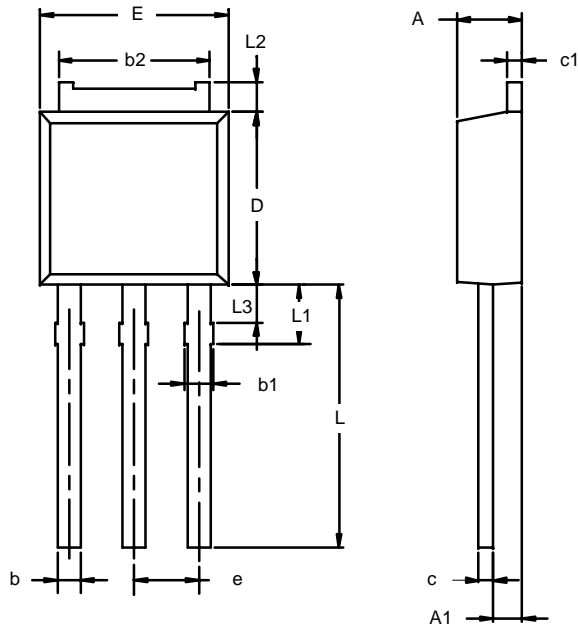
Fig. 13b - Gate Charge Test Circuit



Note

a. $V_{GS} = 5\text{ V}$ for logic level devices

Fig. 14 - For N-Channel

TO-251AA (DPAK)

Note: Dimension L3 is for reference only.

Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	2.21	2.38	0.087	0.094
A1	0.89	1.14	0.035	0.045
b	0.71	0.89	0.028	0.035
b1	0.76	1.14	0.030	0.045
b2	5.23	5.43	0.206	0.214
c	0.46	0.58	0.018	0.023
c1	0.46	0.58	0.018	0.023
D	5.97	6.22	0.235	0.245
E	6.48	6.73	0.255	0.265
e	2.28 BSC		0.090 BSC	
L	3.89	9.53	0.153	0.375
L1	1.91	2.28	0.075	0.090
L2	0.89	1.27	0.035	0.050
L3	1.15	1.52	0.045	0.060

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