

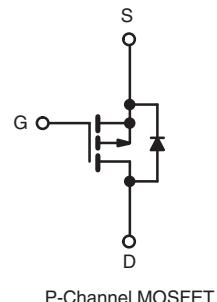
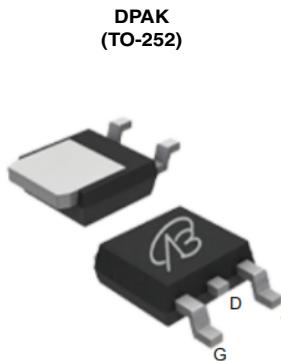
J130-VB Datasheet

P-Channel 500V (D-S) Power MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	- 500	
$R_{DS(on)}$ (Ω)	$V_{GS} = - 10$ V	4.0
Q_g (Max.) (nC)	13	
Q_{gs} (nC)	3.2	
Q_{gd} (nC)	5.0	
Configuration	Single	

FEATURES

- P-Channel
- Surface Mount
- Straight Lead
- Advanced Process Technology
- Fast Switching
- Fully Avalanche Rated



ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V_{GS} at - 10 V	V_{DS}	- 500	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current	$T_C = 25$ °C	I_D	- 4.0	A
	$T_C = 100$ °C		- 3.1	
Pulsed Drain Current ^a		I_{DM}	-15	
Linear Derating Factor			0.40	W/°C
Single Pulse Avalanche Energy ^b		E_{AS}	92	mJ
Repetitive Avalanche Current ^a		I_{AR}	- 4	A
Repetitive Avalanche Energy ^a		E_{AR}	15.0	mJ
Maximum Power Dissipation	$T_C = 25$ °C	P_D	80	W
Peak Diode Recovery dV/dt ^c		dV/dt	- 24	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	

Notes

- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- Starting $T_J = 25$ °C, $L = 57$ mH, $R_g = 25$ Ω , $I_{AS} = - 1.8$ A (see fig. 12).
- $I_{SD} \leq - 1.1$ A, $dI/dt \leq 450$ A/ μ s, $V_{DD} \leq V_{DS}$, $T_J \leq 150$ °C.
- 1.6 mm from case.

THERMAL RESISTANCE RATINGS					
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	R_{thJA}	-	-	110	°C/W
Maximum Junction-to-Ambient (PCB Mount) ^a	R_{thJA}	-	-	50	
Maximum Junction-to-Case (Drain)	R_{thJC}	-	-	2.5	

Note

a. When mounted on 1" square PCB (FR-4 or G-10 material).

SPECIFICATIONS ($T_J = 25$ °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		- 500	-	-	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to 25 °C, $I_D = - 1$ mA		-	- 0.41	-	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}	$V_{GS} = \pm 20$ V		-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = - 500$ V, $V_{GS} = 0$ V		-	-	- 100	µA
		$V_{DS} = - 400$ V, $V_{GS} = 0$ V, $T_J = 125$ °C		-	-	- 500	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = - 10$ V	$I_D = - 3.1$ A ^b	-	4	-	Ω
Forward Transconductance	G_{fs}	$V_{DS} = - 50$ V, $I_D = - 3.1$ A		0.91	-	-	S
Dynamic							
Input Capacitance	C_{iss}	$V_{GS} = 0$ V, $V_{DS} = - 25$ V, $f = 1.0$ MHz, see fig. 5		-	940	-	pF
Output Capacitance	C_{oss}			-	50	-	
Reverse Transfer Capacitance	C_{rss}			-	8.0	-	
Total Gate Charge	Q_g	$V_{GS} = - 10$ V	$I_D = - 1.1$ A, $V_{DS} = - 320$ V, see fig. 6 and 13 ^b	-	-	13	nC
Gate-Source Charge	Q_{gs}			-	-	3.2	
Gate-Drain Charge	Q_{gd}			-	-	5.0	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = - 200$ V, $I_D = - 1.1$ A, $R_g = 21$ Ω, $R_D = 180$ Ω, see fig. 10 ^b		-	11	-	ns
Rise Time	t_r		-	10	-		
Turn-Off Delay Time	$t_{d(off)}$		-	25	-		
Fall Time	t_f		-	24	-		
Internal Drain Inductance	L_D	Between lead, 6 mm (0.25") from package and center of die contact ^c		-	4.5	-	nH
Internal Source Inductance	L_S			-	7.5	-	
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p-n junction diode		-	-	- 1.9	A
Pulsed Diode Forward Current ^a	I_{SM}			-	-	- 7.6	
Body Diode Voltage	V_{SD}	$T_J = 25$ °C, $I_S = - 1.1$ A, $V_{GS} = 0$ V ^b		-	-	- 4.0	V
Body Diode Reverse Recovery Time	t_{rr}	$T_J = 25$ °C, $I_F = - 1.1$ A, $dI/dt = 100$ A/µs ^b		-	170	260	ns
Body Diode Reverse Recovery Charge	Q_{rr}			-	640	960	nC
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 ≤ 300 µs; duty cycle ≤ 2 %.
c. This is applied for IPAK, L_S of DPAK is measured between lead and center of die contact.

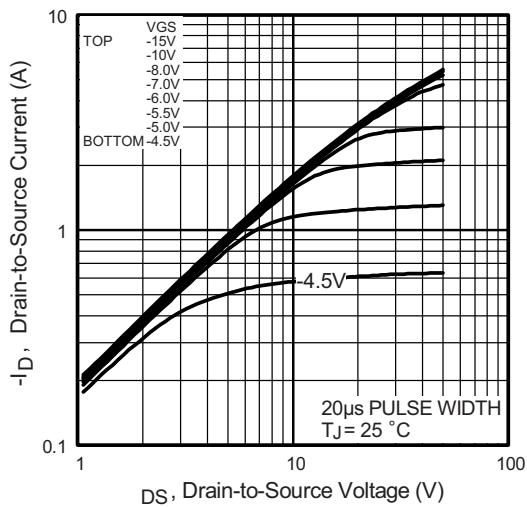
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)


Fig. 1 - Typical Output Characteristics

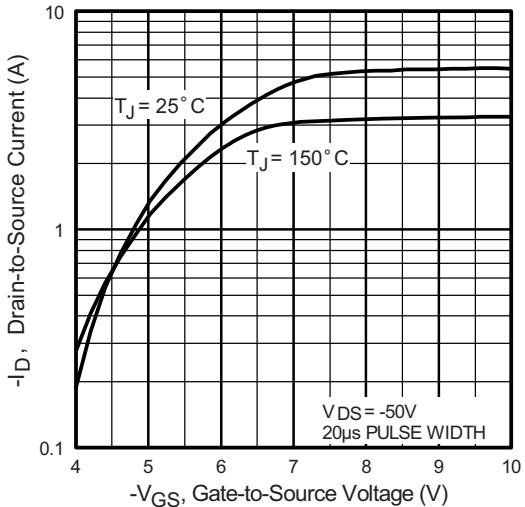


Fig. 3 - Typical Transfer Characteristics

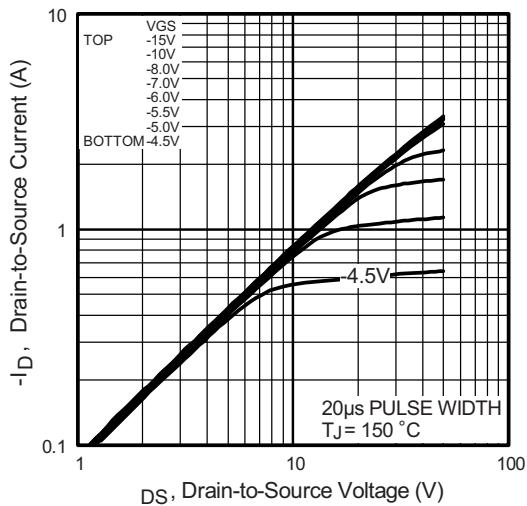


Fig. 2 - Typical Output Characteristics

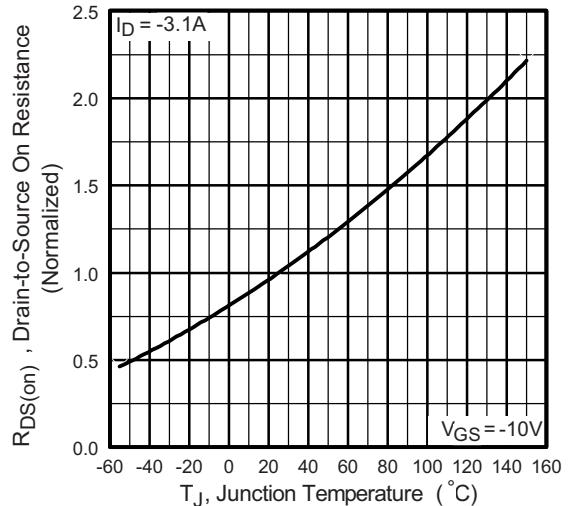


Fig. 4 - Normalized On-Resistance vs. Temperature

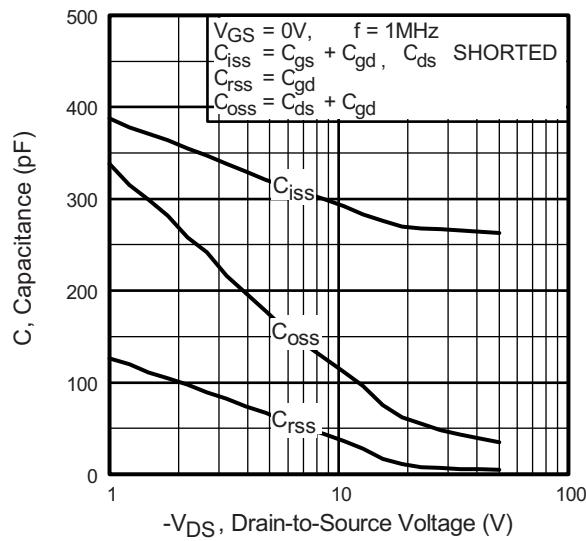


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

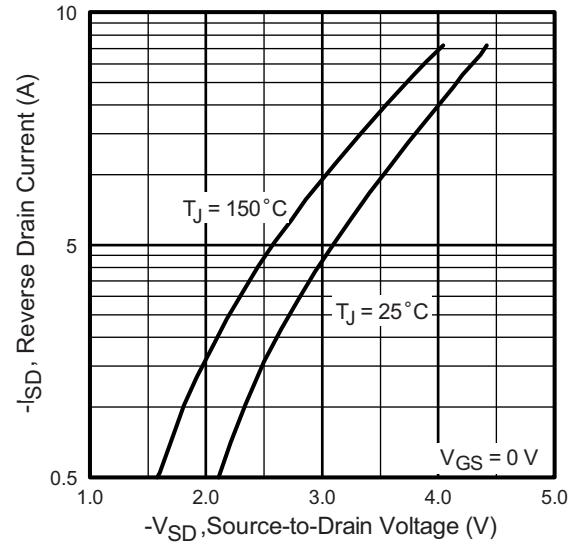


Fig. 7 - Typical Source-Drain Diode Forward Voltage

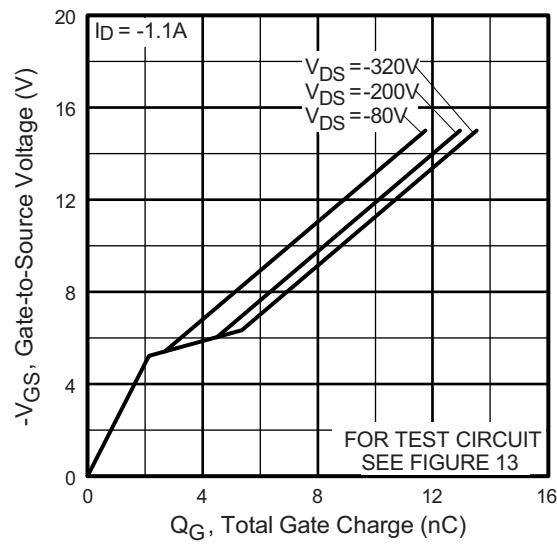


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

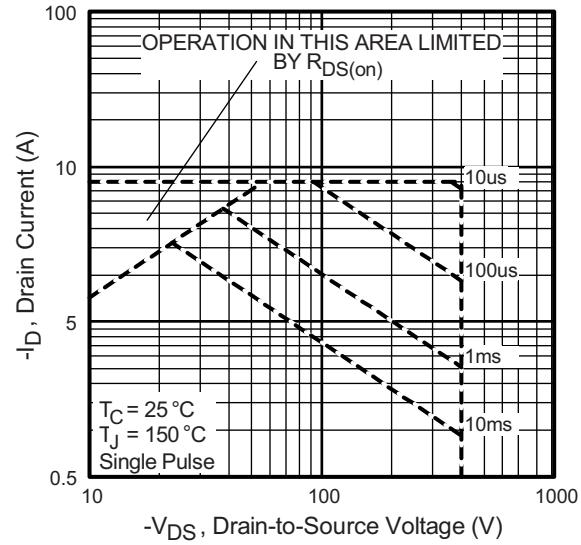


Fig. 8 - Maximum Safe Operating Area

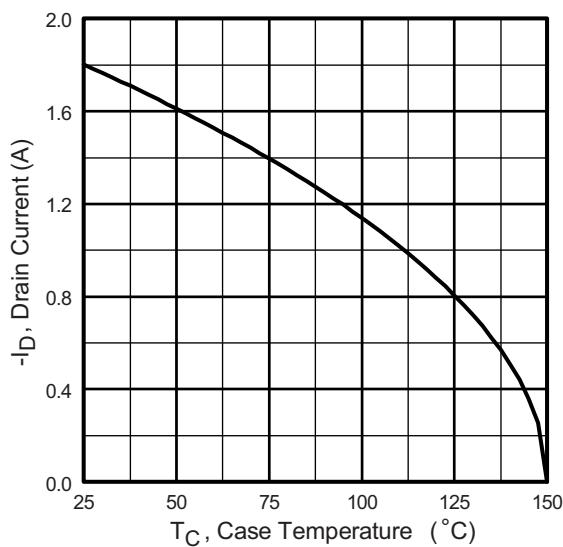


Fig. 9 - Maximum Drain Current vs. Case Temperature

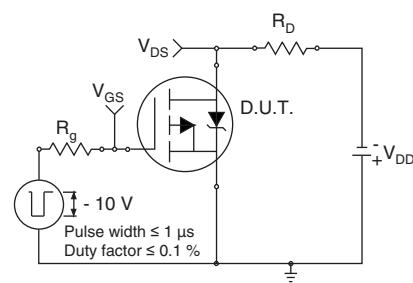


Fig. 10a - Switching Time Test Circuit

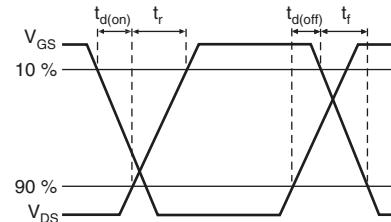


Fig. 10b - Switching Time Waveforms

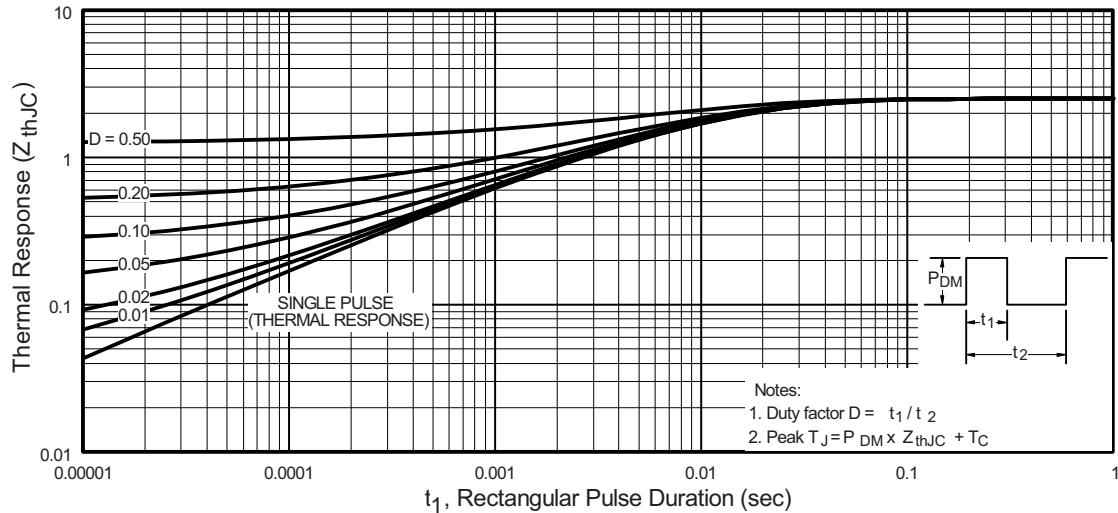


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

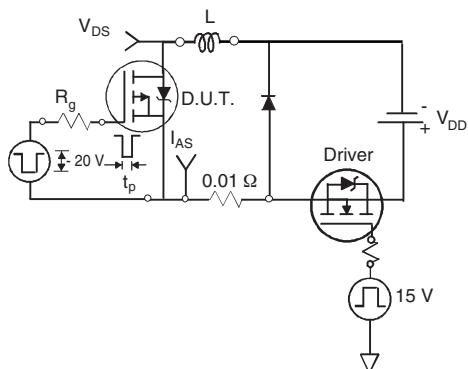


Fig. 12a - Unclamped Inductive Test Circuit

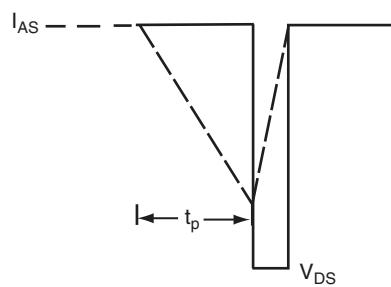


Fig. 12b - Unclamped Inductive Waveforms

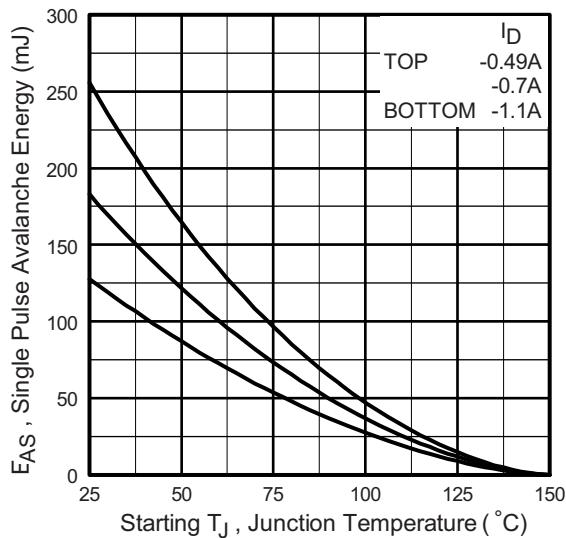


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

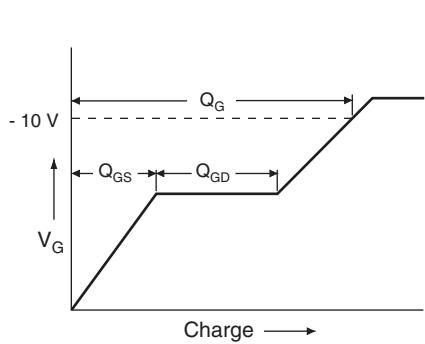


Fig. 13a - Basic Gate Charge Waveform

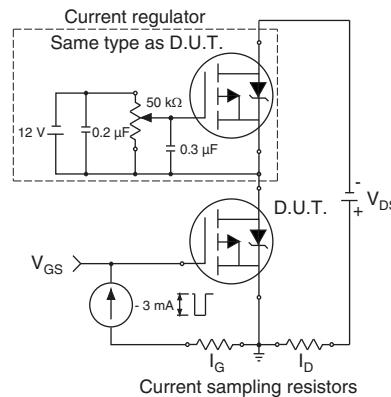


Fig. 13b - Gate Charge Test Circuit

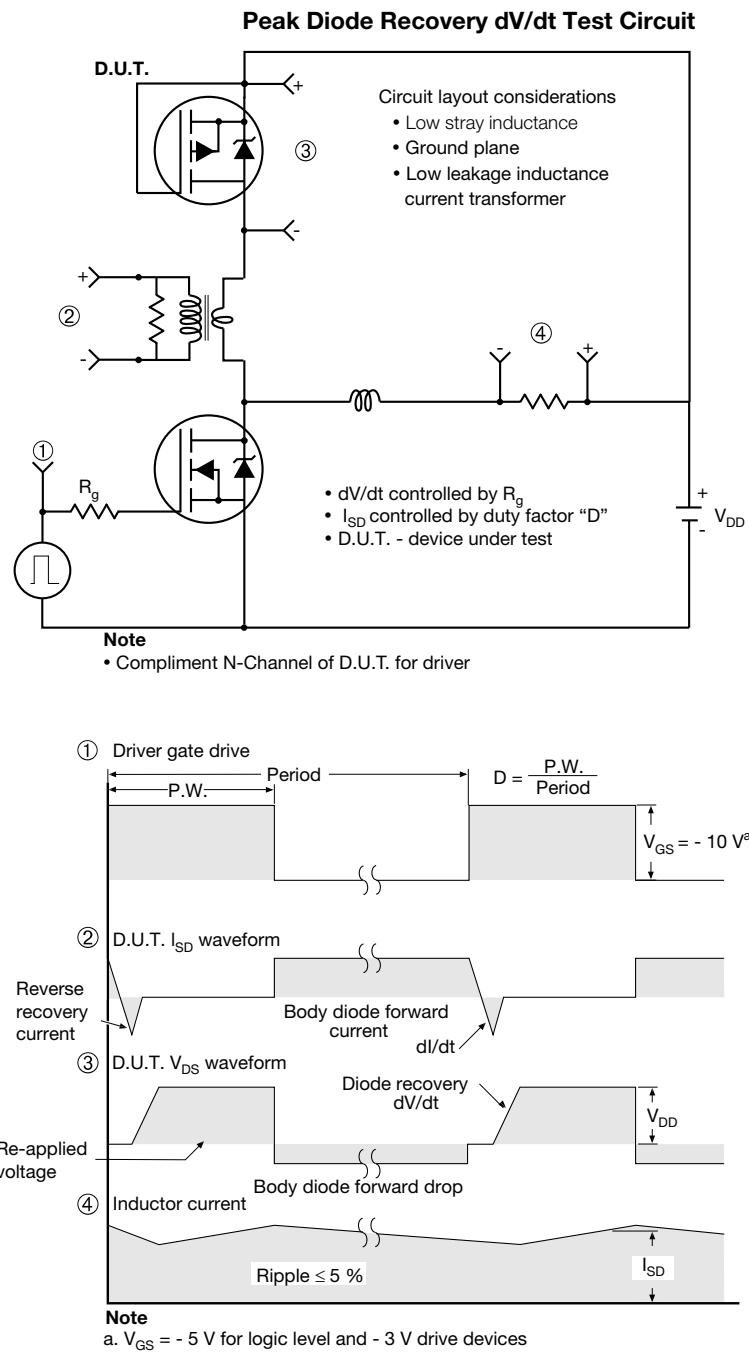
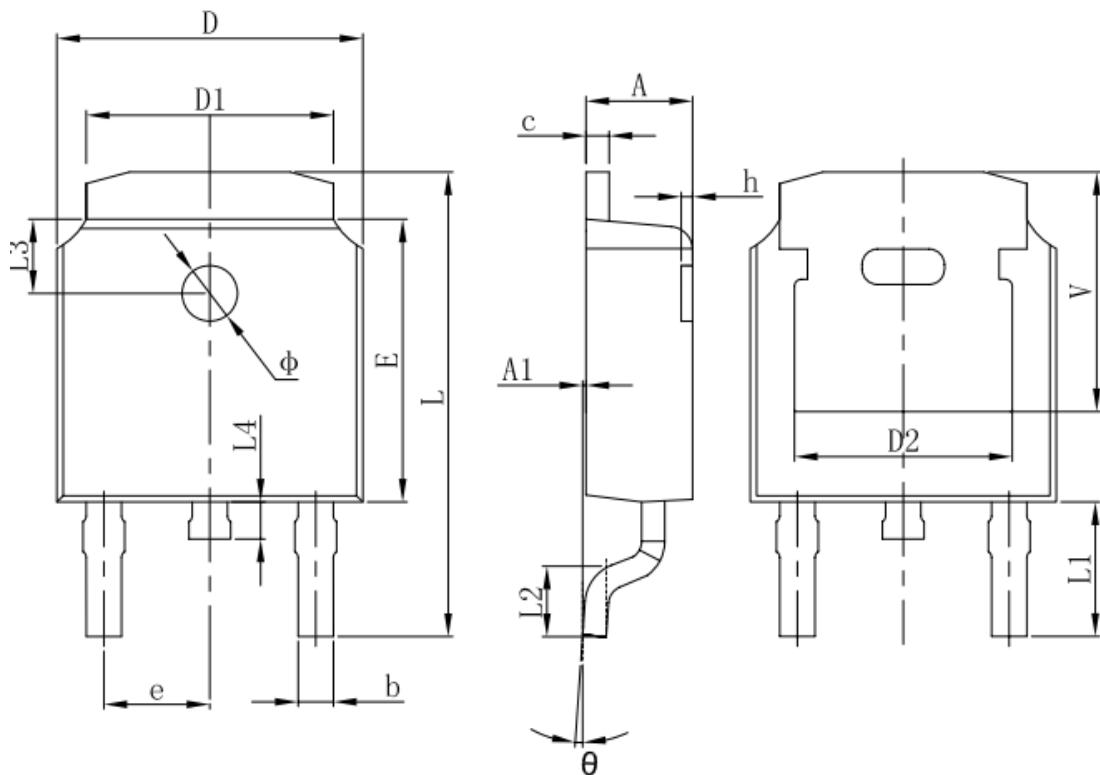
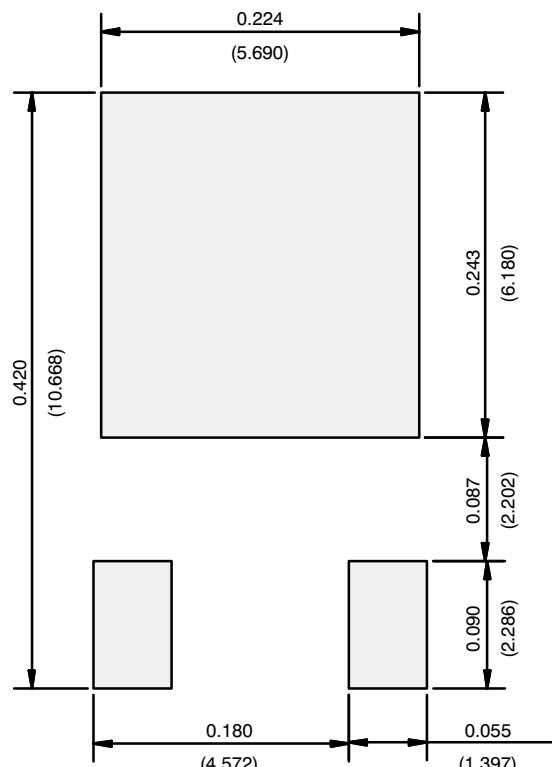


Fig. 14 - For P-Channel

TO252 Package Information



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.635	0.770	0.025	0.030
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.712	10.312	0.382	0.406
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 REF.		0.063 REF.	
L4	0.600	1.000	0.024	0.039
φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.250 REF.		0.207 REF.	

RECOMMENDED MINIMUM PADS FOR DPAK (TO-252)

Recommended Minimum Pads
Dimensions in Inches/(mm)

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