

## N-CHANNEL MOSFET

Qualified per MIL-PRF-19500/592

### DEVICES

**2N7228 2N7228U**

### LEVELS

**JAN  
 JANTX  
 JANTXV**

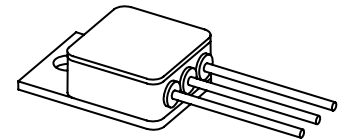
### ABSOLUTE MAXIMUM RATINGS ( $T_C = +25^\circ\text{C}$ unless otherwise noted)

Parameters / Test Conditions	Symbol	Value	Unit
Drain – Source Voltage	$V_{DS}$	500	Vdc
Gate – Source Voltage	$V_{GS}$	$\pm 20$	Vdc
Continuous Drain Current $T_C = +25^\circ\text{C}$	$I_{D1}$	12.0	A <sub>dc</sub>
Continuous Drain Current $T_C = +100^\circ\text{C}$	$I_{D2}$	8.0	A <sub>dc</sub>
Max. Power Dissipation $T_C = +25^\circ\text{C}$	$P_{tl}$	150 <sup>(1)</sup>	W
Drain to Source On State Resistance	$R_{ds(on)}$	0.415 <sup>(2)</sup>	$\Omega$
Operating & Storage Temperature	$T_{op}, T_{stg}$	-55 to +150	$^\circ\text{C}$

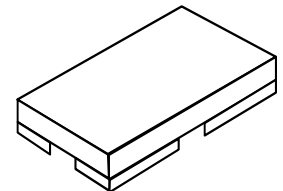
**Note:** (1) Derated Linearly by 1.2 W/ $^\circ\text{C}$  for  $T_C > +25^\circ\text{C}$   
 (2)  $V_{GS} = 10\text{Vdc}, I_D = 8\text{A}$

### ELECTRICAL CHARACTERISTICS ( $T_A = +25^\circ\text{C}$ , unless otherwise noted)

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Drain-Source Breakdown Voltage $V_{GS} = 0\text{V}, I_D = 1\text{mA}_{dc}$	$V_{(BR)DSS}$	500		Vdc
Gate-Source Voltage (Threshold) $V_{DS} \geq V_{GS}, I_D = 0.25\text{mA}$ $V_{DS} \geq V_{GS}, I_D = 0.25\text{mA}, T_j = +125^\circ\text{C}$ $V_{DS} \geq V_{GS}, I_D = 0.25\text{mA}, T_j = -55^\circ\text{C}$	$V_{GS(th)1}$ $V_{GS(th)2}$ $V_{GS(th)3}$	2.0 1.0	4.0 5.0	Vdc
Gate Current $V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$ $V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}, T_j = +125^\circ\text{C}$	$I_{GSS1}$ $I_{GSS2}$		$\pm 100$ $\pm 200$	nA <sub>dc</sub>
Drain Current $V_{GS} = 0\text{V}, V_{DS} = 400\text{V}$ $V_{GS} = 0\text{V}, V_{DS} = 400\text{V}, T_j = +125^\circ\text{C}$	$I_{DSS1}$ $I_{DSS2}$		25 0.25	$\mu\text{A}_{dc}$ mA <sub>dc</sub>
Static Drain-Source On-State Resistance $V_{GS} = 10\text{V}, I_D = 8.0\text{A}$ pulsed $V_{GS} = 10\text{V}, I_D = 12.0\text{A}$ pulsed $T_j = +125^\circ\text{C}$ $V_{GS} = 10\text{V}, I_D = 8.0\text{A}$ pulsed	$r_{DS(on)1}$ $r_{DS(on)2}$ $r_{DS(on)3}$		0.415 0.515 0.90	$\Omega$ $\Omega$ $\Omega$
Diode Forward Voltage $V_{GS} = 0\text{V}, I_D = 12\text{A}$ pulsed	$V_{SD}$		1.7	Vdc



**TO-254AA**



**U-PKG (U3)  
 TO-276AB**

## DYNAMIC CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Gate Charge:				
On-State Gate Charge	$Q_{g(on)}$		120	nC
Gate to Source Charge	$Q_{gs}$		19	
Gate to Drain Charge	$Q_{gd}$		70	

$V_{GS} = 10V, I_D = 12A$   
 $V_{DS} = 50V$

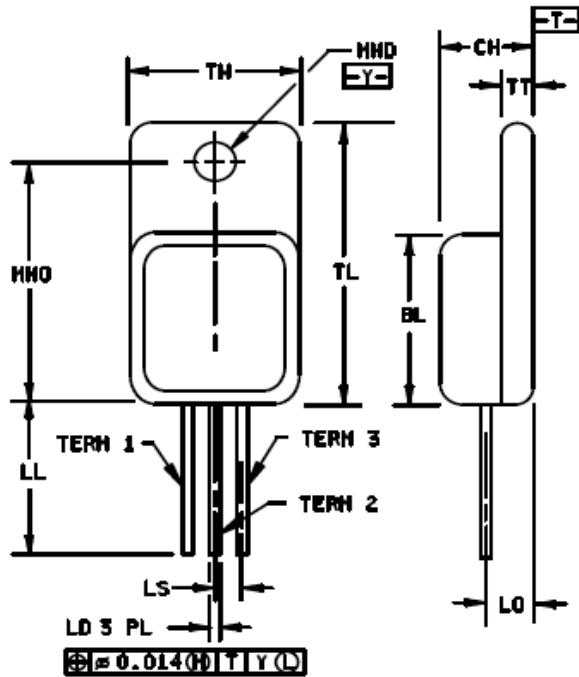
## SWITCHING CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Switching time tests:				
Turn-on delay time	$t_{d(on)}$		35	ns
Rinse time	$t_r$		190	
Turn-off delay time	$t_{d(off)}$		170	
Fall time	$t_f$		130	
Diode Reverse Recovery Time	$t_{rr}$		1600	ns

$I_D = 12A, V_{GS} = 10Vdc,$   
 Gate drive impedance =  $7.5\Omega,$   
 $V_{DD} = 250Vdc$

$di/dt \leq 100A/\mu s, V_{DD} \leq 30V,$   
 $I_F = 12A$

▶ **PACKAGE DIMENSIONS**



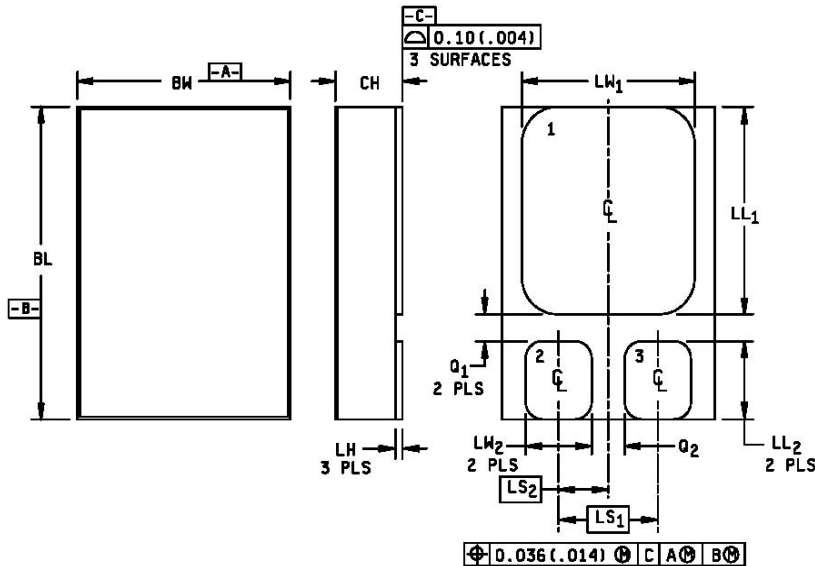
Ltr.	Dimensions				Note
	Inches		Millimeters		
	Min	Max	Min	Max	
BL	.535	.545	13.59	13.84	
CH	.249	.260	6.32	6.60	
LD	.035	.045	0.89	1.14	
LL	.510	.570	12.95	14.48	
LO	.150 BSC		3.81 BSC		
LS	.150 BSC		3.81 BSC		
MHD	.139	.149	3.53	3.78	
MHO	.665	.685	16.89	17.40	
TL	.790	.800	20.07	20.32	3, 4
TT	.040	.050	1.02	1.27	
TW	.535	.545	13.59	13.84	3, 4
Term 1	Drain				
Term 2	Source				
Term 3	Gate				

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Glass meniscus included in dimension D and E.
4. All terminals are isolated from the case.
5. In accordance with ASME Y14.5M, diameters are equivalent to  $\phi x$  symbology.

**FIGURE 1.** Physical dimensions for TO-254AA

## PACKAGE DIMENSIONS



Ltr.	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
BL	.620	.630	15.75	16.00
BW	.445	.455	11.30	11.56
CH		.142		3.60
LH	.010	.020	0.26	0.50
LL <sub>1</sub>	.410	.420	10.41	10.67
LL <sub>2</sub>	.152	.162	3.86	4.11
LS <sub>1</sub>	.210 BSC		5.33 BSC	
LS <sub>2</sub>	.105 BSC		2.67 BSC	
LW <sub>1</sub>	.370	.380	9.40	9.65
LW <sub>2</sub>	.135	.145	3.43	3.68
Q <sub>1</sub>	.030		0.76	
Q <sub>2</sub>	.035		0.89	
Term 1	Drain			
Term 2	Source			
Term 3	Gate			

**NOTES:**

1. Dimensions are in inches.
2. Millimeters are given for information only.
3. The lid shall be electrically isolated from the drain, gate and source.
4. In accordance with ASME Y14.5M, diameters are equivalent to  $\phi x$  symbology.

**FIGURE 2.** Dimensions and configuration of surface mount package outline (TO-276AB) 2N7224U, 2N7225U, 2N7227U, and 2N7228U.