2N7479U3; 2N7480U3; 2N7481U3

N-Channel Radiation Hardened MOSFET (TO-276AA)

Rev. V7

Introduction

VPT Components' new radiation-tolerant power MOSFETs are now available in die and standard U3 package options, as well as custom packaging for HiRel environments. Applications within the military, aerospace, medical, nuclear power generation, and high-energy physics research laboratories can benefit from the use of this new series of MOSFETs. VPT Components' power MOSFETs are radiation tolerant to 100 krad (Si) and are SEGR/SEB immune to their full rated breakdown potential.

Operational power losses are minimized by VPT Components' ideal combination of low $r_{DS(on)}$ and gate charge. Die size is optimized for maximum current rating while meeting industry norms. These units are suitable for stand alone and hybrid applications.

These MOSFETs are well suited for low loss switching applications, such as DC to DC con-

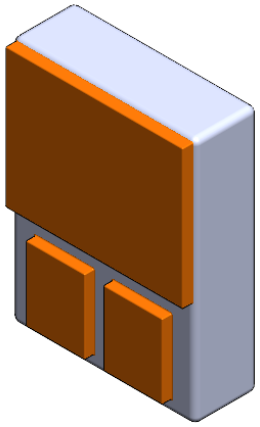
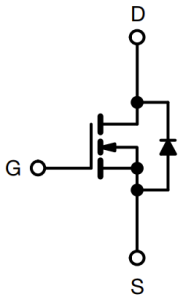


FIGURE 1:
TO-276AA, SMD-0.5 (U3)
Package



N-Channel MOSFET

Features

- Available in JANSR, JANTXVR
  Per MIL-PRF-19500/703
- TO-276AA, SMD-0.5 (U3) package
- Hermetically Sealed

Maximum Ratings (T_A = +25°C unless otherwise specified)

Type	P_T T_C = +25°C (1)	P_T T_A= +25°C (free air)	$R_{\theta JC}$	V_{DS}	V_{DG}	V_{GS}	I_{D1} T_C = +25°C	I_{D2} T_C = +100°C	I_S	I_{DM}	T_J & T_{STG}	Max $r_{DS(on)1}$ V_{GS} = 10 V dc, I_D = I_{D2} T_J = +25°C (1)
	W	W	°C/W	V dc	V dc	V dc	A dc	A dc	A dc	A (pk)	°C	Ω
2N7479U3 2N7480U3 2N7481U3	75	1.0	1.67	30 60 100	30 60 100	±20	22	22 21 16	22	88	-55 to +150	0.020 0.030 0.060

NOTES:
1. Derate linearly by 0.6 W/°C for T_C > +25°C.

Primary Electrical Characteristics

Characteristics	Test Conditions	Symbol	Min.	Max.	Unit
Drain-Source Breakdown Voltage 2N7479U3 2N7480U3 2N7481U3	V_{GS} = 0 V, I_D = 1 mA	$V_{(BR)DSS}$	 30 60 100	—	V dc
Gate-Threshold Voltage	$V_{DS} \geq V_{GS}$, I_D = 0.25 mA	$V_{GS(TH)1}$	2.0	4.0	V dc
Gate-Body Leakage Forward	V_{GS} = +20V, V_{DS} = 0V	I_{GSSF1}	—	+100	nA
Gate-Body Leakage Reverse	V_{GS} = -20V, V_{DS} = 0V	I_{GSSR1}	—	-100	nA
Zero-Gate Voltage Drain Current 2N7479U3 2N7480U3 2N7481U3	V_{GS} = 0V, V_{DS} = 24V V_{DS} = 48V V_{DS} = 80V	I_{DSS1}	—	10	µA
Forward Voltage Drain Diode 2N7479U3 2N7480U3 2N7481U3	Pulsed dc Voltage V_{GS} = 0V, I_{D1} = 22A I_{D1} = 22A I_{D1} = 22A	V_{SD}	—	1.2	V
Forward Transconductance 2N7479U3 2N7480U3 2N7481U3	V_{DD} = 12V, I_{D2} = 22A I_{D2} = 21A I_{D2} = 16A	g_{FS}	 16 16 13	—	S
Turn-on Delay Time 2N7479U3 2N7480U3 2N7481U3	V_{GS} = 12V, R_G = 2.35Ω, I_{D1} = 22A, V_{DD} = 15V I_{D1} = 22A, V_{DD} = 30V I_{D1} = 22A, V_{DD} = 50V	$t_{d(on)}$	—	25	ns
Rise Time 2N7479U3 2N7480U3 2N7481U3	V_{GS} = 12V, R_G = 2.35Ω, I_{D1} = 22A, V_{DD} = 15V I_{D1} = 22A, V_{DD} = 30V I_{D1} = 22A, V_{DD} = 50V	t_r	—	100	ns
Turn-off Delay Time 2N7479U3 2N7480U3 2N7481U3	V_{GS} = 12V, R_G = 2.35Ω, I_{D1} = 22A, V_{DD} = 15V I_{D1} = 22A, V_{DD} = 30V I_{D1} = 22A, V_{DD} = 50V	$t_{d(off)}$	—	35	ns
Fall Time 2N7479U3 2N7480U3 2N7481U3	V_{GS} = 12V, R_G = 2.35Ω, I_{D1} = 22A, V_{DD} = 15V I_{D1} = 22A, V_{DD} = 30V I_{D1} = 22A, V_{DD} = 50V	t_f	—	30	ns

NOTE: All voltages and currents are in dc.

Primary Electrical Characteristics

Characteristics	Test Conditions	Symbol	Min.	Max.	Unit
On-state Gate Charge 2N7479U3 2N7480U3 2N7481U3	V_{GS} = ±20V, T_A = +175°C, t=24 hours	$Q_{G(on)}$	—	 65 45 50	nC
Gate to Source Charge 2N7479U3 2N7480U3 2N7481U3	V_{GS} = ±20V, T_A = +175°C, t=24 hours	Q_{GS}	—	 20 10 7.4	nC
Gate to Drain Charge 2N7479U3 2N7480U3 2N7481U3	V_{GS} = ±20V, T_A = +175°C, t=24 hours	Q_{GS}	—	 10 15 20	nC
Reverse Recovery Time 2N7479U3 2N7480U3 2N7481U3	di/dt = 100A/µs, $V_{DD} \leq V_{(BR)DSS}$, I_{D1} = 22A I_{D1} = 22A I_{D1} = 22A	t_{rr}	—	 102 125 250	ns

Temperature Testing Electrical Characteristics

Characteristics	Test Conditions	Symbol	Min.	Max.	Unit
High Temperature Operation	$T_C = T_J$ = +125°C	—	—	—	—
Gate-Body Leakage Forward	V_{GS} = +20V, V_{DS} = 0V	I_{GSSF2}	—	+200	nA
Gate-Body Leakage Reverse	V_{GS} = -20V, V_{DS} = 0V	I_{GSSR2}	—	-200	nA
Zero-Gate Voltage Drain Current 2N7479U3 2N7480U3 2N7481U3	V_{GS} = 12V V_{DS} =24V V_{DS} =48V V_{DS} =80V	I_{DSS2}	—	25	µA
Drain-Source On-Resistance 2N7479U3 2N7480U3 2N7481U3	V_{GS} = 12V, I_{D2} = 22A I_{D2} = 21A I_{D2} = 16A	$r_{DS(on)3}$	—	0.035 0.060 0.110	Ω
Gate-Threshold Voltage	$V_{DS} \geq V_{GS}$, I_D = 1.0 mA	$V_{GS(TH)2}$	1.0	—	V
Characteristics	**Test Conditions**	**Symbol**	**Min.**	**Max.**	**Unit**
Low Temperature Operation	$T_C = T_J$ = -55°C	—	—	—	—
Gate-Threshold Voltage	$V_{DS} \geq V_{GS}$, I_D = 1.0mA	$V_{GS(TH)3}$	—	5.0	V

NOTE: All voltages and currents are in dc.

Outline Drawing (TO-276AA, SMD-0.5)

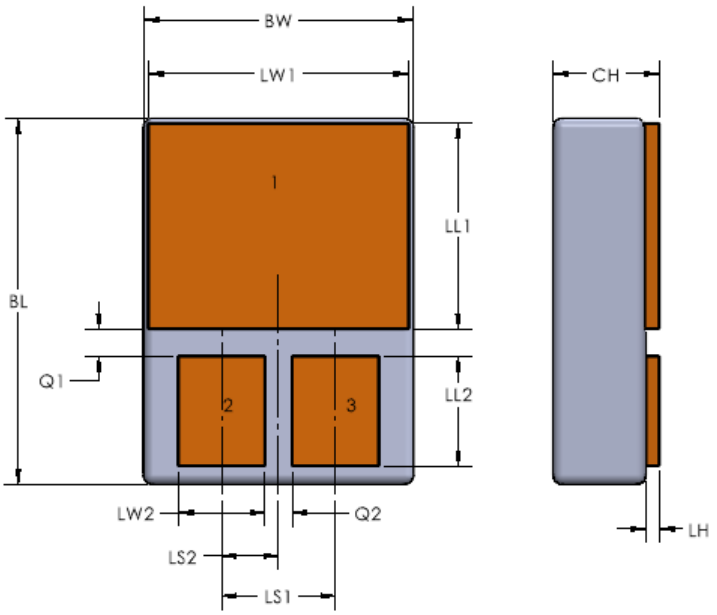


FIGURE 2: Dimensions and configuration of surface mount (TO-276AA, SMD-0.5) package.

Symbol	Inches		mm	
	Min	Max	Min	Max
BL	.395	.405	10.04	10.29
BW	.291	.301	7.39	7.65
CH	.1085	.124	2.76	3.15
LW1	.281	.291	7.14	7.39
LW2	.090	.100	2.29	2.54
LL1	.220	.230	5.59	5.84
LL2	.115	.125	2.92	3.18
LS1	.150 BSC		3.81BSC	
LS2	.075 BSC		1.91 BSC	
Q1	.030		.762	
Q2	.030		.762	
1	Drain			
2	Gate			
3	Source			

NOTES:
1. Dimension are in inches.
2. Millimeters are given for information only.
3. The lid shall be electrically isolated from the drain, gate and source.