2N7492T2
2N7493T2

N-Channel Radiation Hardened MOSFET (TO-39)

Rev. V6

Introduction

VPT Components' new radiation tolerant power MOSFETs are now available in die and TO-39 standard package options, as well as custom packaging for HiRel environments. Applications within 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 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 converters and solid-state relays. Die performance is drop-in compatible with industry standards.

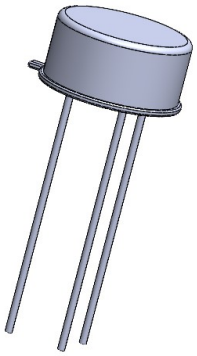
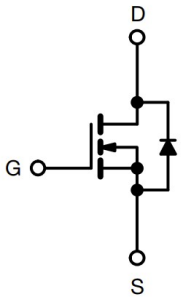


FIGURE 1.
TO-39 (TO-205AF)



N-Channel MOSFET

Features

- Available in JANSR, JANVR
  Per MIL-PRF-19500/701
- TO-39 (TO-205AF,T2) packages
- 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} = 12V 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
2N7492T2 2N7493T2	25	0.71	5	60 100	60 100	±20	12 11.7	9.5 7.4	12 11.7	48 46.8	-55 to +150	0.048 0.080

NOTES:
1. Derate linearly by 0.2 W/°C for T_C > +25°C.

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Primary Electrical Characteristics (2N7492T2; 2N7493T2)

Characteristics	Test Conditions	Symbol	Min.	Max.	Unit
Drain-Source Breakdown Volt- 2N7492T2 2N7493T2	V_{GS} = 0 V, I_D = 1 mA	$V_{(BR)DSS}$	60 100	—	V dc
Gate-Threshold Voltage	$V_{DS} \geq V_{GS}$, I_D = 1 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 2N7492T2 2N7493T2	V_{GS} = 0V, V_{DS} = 48V V_{DS} = 80V	I_{DSS1}	—	10	µA
Forward Voltage Drain Diode 2N7492T2 2N7493T2	Pulsed dc Voltage V_{GS} = 0V, I_D = 12A I_D = 11.7A	V_{SD}	—	1.5	V
Forward Transconductance 2N7492T2 2N7493T2	V_{DD} = 15V I_D = 9.5A I_D = 7.4A	g_{FS}	12 8.7	—	S
Turn-on Delay Time 2N7492T2 2N7493T2	V_{GS} = 12V, R_G = 7.5Ω, I_D = 12A, V_{DD} = 30V I_D = 11.7A, V_{DD} = 50V	$t_{d(on)}$	—	25	ns
Rise Time 2N7492T2 2N7493T2	V_{GS} = 12V, R_G = 7.5Ω, I_D = 12A, V_{DD} = 30V I_D = 11.7A, V_{DD} = 50V	t_r	—	100	ns
Turn-off Delay Time 2N7492T2 2N7493T2	V_{GS} = 12V, R_G = 7.5Ω, I_D = 12A, V_{DD} = 30V I_D = 11.7A, V_{DD} = 50V	$t_{d(off)}$	—	35	ns
Fall Time 2N7492T2 2N7493T2	V_{GS} = 12V, R_G = 7.5Ω, I_D = 12A, V_{DD} = 30V I_D = 11.7A, V_{DD} = 50V	t_f	—	30	ns
On-state Gate Charge 2N7492T2 2N7493T2	V_{GS} = ±20V, T_A = +175°C, t=24 hours	$Q_{G(ON)}$	—	40 50	nC
Gate to Source Charge 2N7492T2 2N7493T2	V_{GS} = ±20V, T_A = +175°C, t=24 hours	Q_{GS}	—	10 7.4	nC
Gate to Drain Charge 2N7492T2 2N7493T2	V_{GS} = ±20V, T_A = +175°C, t=24 hours	Q_{GD}	—	15 20	nC
Reverse Recovery Time 2N7492T2 2N7493T2	di/dt = -100A/µs, I_D = 12A $V_{DD} \leq V_{(BR)DSS,} \leq$ 50V, I_D = 11.7A	t_{rr}	—	100 202	ns

NOTE: All voltages and currents are in dc

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Temperature Testing Electrical Characteristics (2N7492T2; 2N7493T2)

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 2N7492T2 2N7493T2	$V_{GS} = 0V$ $V_{DS} = 48V$ $V_{DS} = 80V$	I_{DSS2}	—	25	µA
Drain-Source On-Resistance 2N7492T2 2N7493T2	$V_{GS} = 12V$, $I_D = 9.5A$ $I_D = 7.4A$	$r_{DS(on)3}$	—	0.096 0.160	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	$V_{DS} \geq V_{GS}$, $I_D = 1.0$mA	$V_{GS(TH)3}$	—	5.0	V

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Outline Drawing (TO-39)

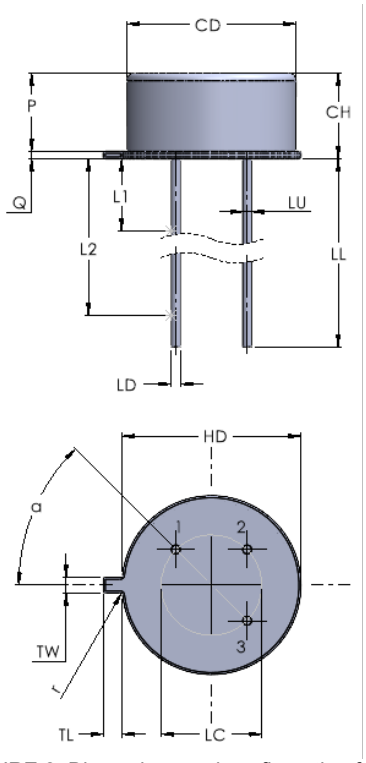

FIGURE 2. Dimensions and configuration for TO-39 (TO-205AF, T2) package.

Symbol	Inches		mm	
	Min	Max	Min	Max
CD	.315	.355	8.01	9.01
CH	.160	.180	4.07	4.57
HD	.340	.370	8.64	9.40
LC	.200TP		5.08 TP	
LD	.016	.019	0.41	0.48
LL	.500	.750	12.70	19.05
LU	.016	.019	0.41	0.48
L1		.050		1.27
L2	.250		6.35	
P	.100		2.54	
Q		.050		1.27
TL	.029	.045	0.74	1.14
TW	.028	.034	0.72	0.86
r		.010		0.25
α	45° BSC		45° BSC	

NOTES:
1. Dimension are in inches. Millimeters are given for general information only.
2. Terminal 1 = source, terminal 2 = gate, and terminal 3 is electrically connected to the case.
3. Terminal 4 is omitted from this outline.
4. Body contour optional within zone defined by dimensions CD, HD, and Q.
5. Leads at gauge plane .054 +.001 −.000 inch (1.37 +0.03 −0.00 mm) below seating plane shall be within .007 inch (0.18 mm) radius of true position (TP) at maximum material condition (MMC) relative to tab at MMC. The device may be measured by direct methods.
6. Dimension LU applies between dimensions L1 and L2. Dimension LD applies between dimensions L2 and LL minimum. Diameter is uncontrolled in dimension L1 and beyond dimension LL minimum.
7. All three leads.
8. For "L" suffix devices, dimension LL = 1.5 inches (38.10 mm) minimum and 1.75 inches (44.45 mm) maximum.
9. Dimension TL measured from maximum HD.
10. Beyond r (radius) maximum, dimension TW shall be held for a minimum length of .011 inch (0.28

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