

**240V P-CHANNEL ENHANCEMENT MODE VERTICAL DMOS FET**

**Features**

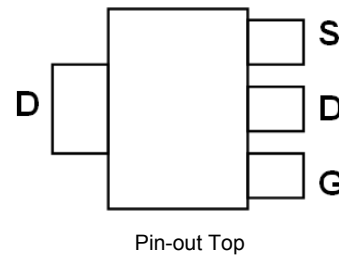
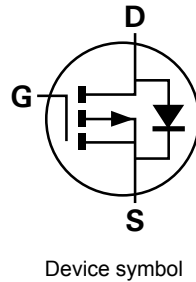
- $BV_{DSS} > -240V$
- $R_{DS(on)} \leq 8.8\Omega @ V_{GS} = -3.5V$
- Low threshold and Fast switching
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP capable (Note 4)**

**Mechanical Data**

- Case: SOT89
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish <sup>(e3)</sup>
- Weight: 0.052 grams (approximate)

**Application**

- Electronic hook switches
- Telecoms and Battery powered equipment

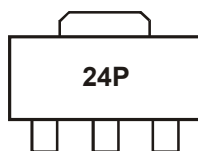


**Ordering Information** (Notes 4 & 5)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZVP4424ZTA	AEC-Q101	24P	7	12	1,000
ZVP4424ZQTA	Automotive	24P	7	12	1,000

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. See <http://www.diodes.com> for more information about Diodes Incorporated's definitions of Halogen and Antimony free, "Green" and Lead-Free.
  3. Halogen and Antimony free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  4. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified.
  5. For packaging details, go to our website at <http://www.diodes.com>.

**Marking Information**



24P = Product type Marking Code

**Maximum Ratings** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

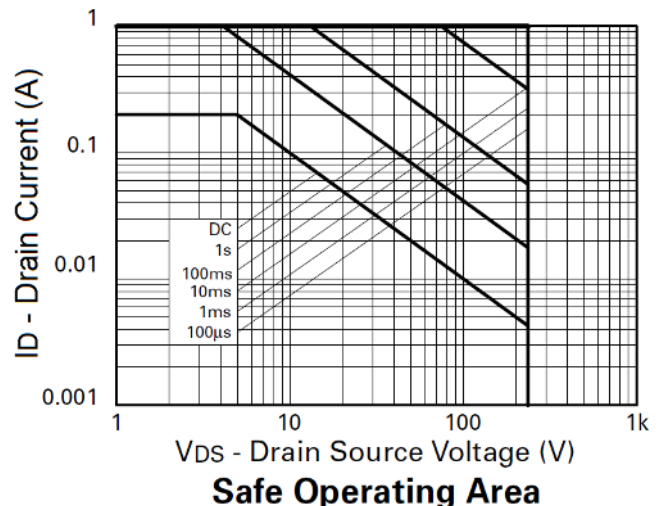
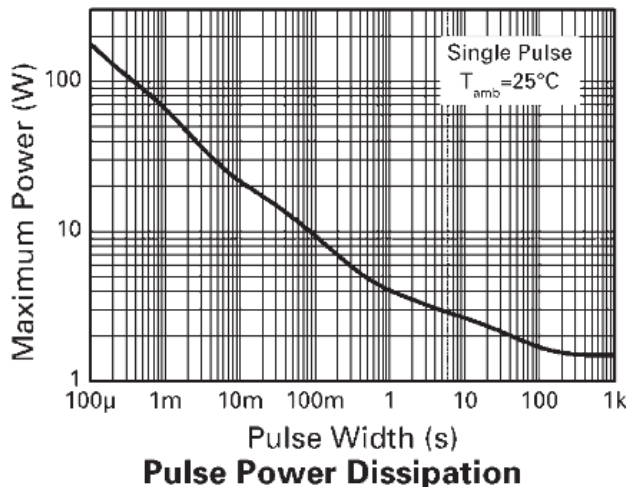
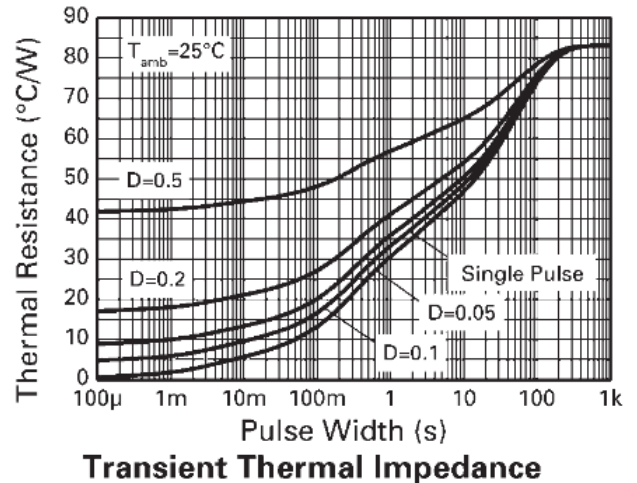
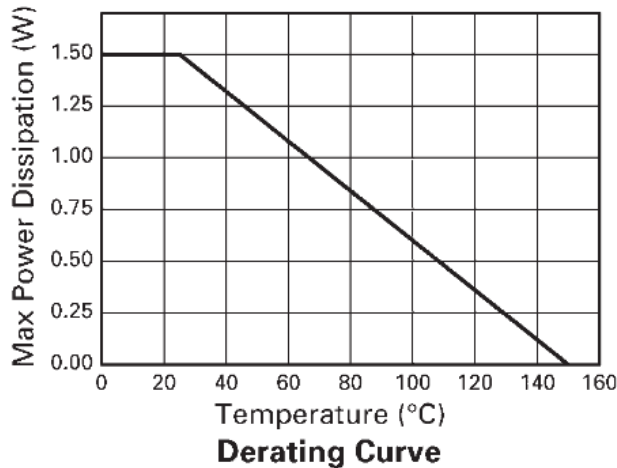
Characteristic	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	-240	V
Gate-Source Voltage	$V_{GSS}$	$\pm 40$	V
Continuous Drain Current	$I_D$	-200	mA
Pulsed Drain Current (Note 8)	$I_{DM}$	-1.0	A

**Thermal Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation	$P_D$	1.5	W
		2.6	W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	83.3	$^\circ\text{C/W}$
		47.4	$^\circ\text{C/W}$
Thermal Resistance, Junction to Leads	$R_{\theta JL}$	3.64	$^\circ\text{C/W}$
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

- Notes:
6. For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
  7. For a device surface mounted on FR4 PCB measured at  $t \leq 10$  sec.
  8. Repetitive rating - 25mm x 25mm FR4 PCB,  $D = 0.02$ , pulse width 300 $\mu\text{s}$  – pulse width limited by maximum junction temperature.
  9. Thermal resistance from junction to solder-point (at the end of the drain lead).

**Thermal Characteristics**

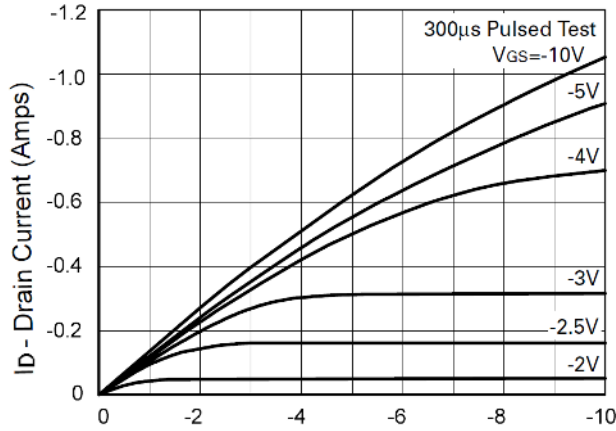


**Electrical Characteristics** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

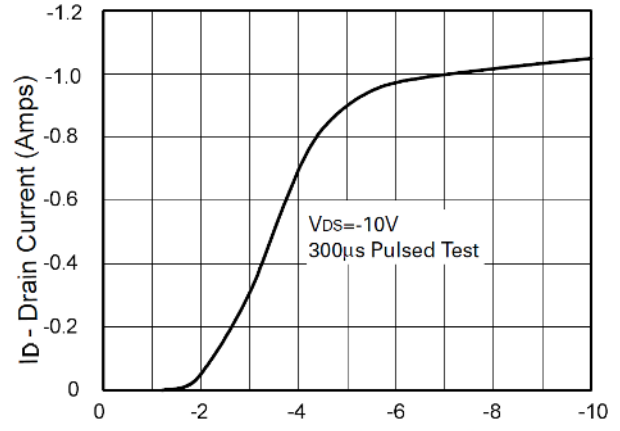
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	-240	—	—	V	$I_D = -1\text{mA}$ , $V_{GS} = 0\text{V}$
Zero Gate Voltage Drain Current	$I_{DSS}$	—	—	-10 -100	$\mu\text{A}$ $\mu\text{A}$	$V_{DS} = -240\text{V}$ , $V_{GS} = 0\text{V}$ $V_{DS} = -190\text{V}$ , $V_{GS} = 0\text{V}$ , $T_A = +125^\circ\text{C}$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 100$	nA	$V_{GS} = \pm 40\text{V}$ , $V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS</b>						
On state Drain Current (Note 10)	$I_{D(on)}$	-0.75	-1.0	—	A	$V_{DS} = -10\text{V}$ , $V_{GS} = -10\text{V}$
Gate Threshold Voltage	$V_{GS(th)}$	-0.7	-1.4	-2.0	V	$I_D = -1\text{mA}$ , $V_{DS} = V_{GS}$
Static Drain-Source On-Resistance (Note 10)	$R_{DS(on)}$	—	7.1 8.8	9 11	$\Omega$	$V_{GS} = -10\text{V}$ , $I_D = -200\text{mA}$ $V_{GS} = -3.5\text{V}$ , $I_D = -100\text{mA}$
Forward Transconductance (Notes 10 & 12)	$g_{fs}$	125	—	—	mS	$V_{DS} = -10\text{V}$ , $I_D = -200\text{mA}$
<b>DYNAMIC CHARACTERISTICS (Note 12)</b>						
Input Capacitance	$C_{iss}$	—	100	200	pF	$V_{DS} = -25\text{V}$ , $V_{GS} = 0\text{V}$ $f = 1.0\text{MHz}$
Output Capacitance	$C_{oss}$	—	18	25		
Reverse Transfer Capacitance	$C_{rss}$	—	5	15		
Turn-On Delay Time (Note 11)	$t_{d(on)}$	—	8	15	ns	$V_{DD} = -50\text{V}$ , $I_D = -250\text{mA}$ $V_{GEN} = -10\text{V}$
Rise Time (Note 11)	$t_r$	—	8	15		
Turn-Off Delay Time (Note 11)	$t_{d(off)}$	—	26	40		
Fall Time (Note 11)	$t_f$	—	20	30		

- Notes:
- 10. Measured under pulsed conditions. Pulse width = 300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$ .
  - 11. Switching characteristics are independent of operating junction temperature.
  - 12. For design aid only, not subject to production testing.

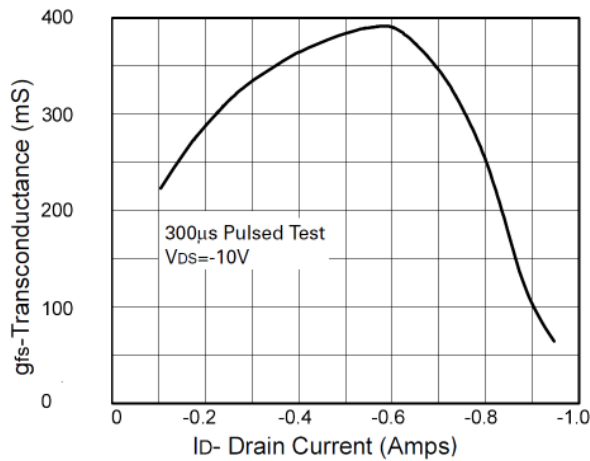
**Typical Characteristics**



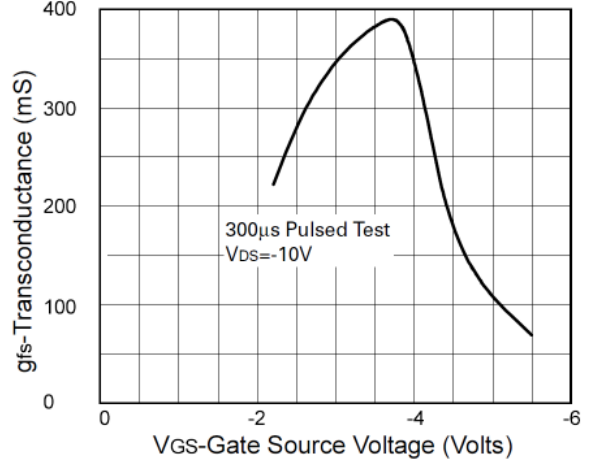
**Saturation Characteristics**



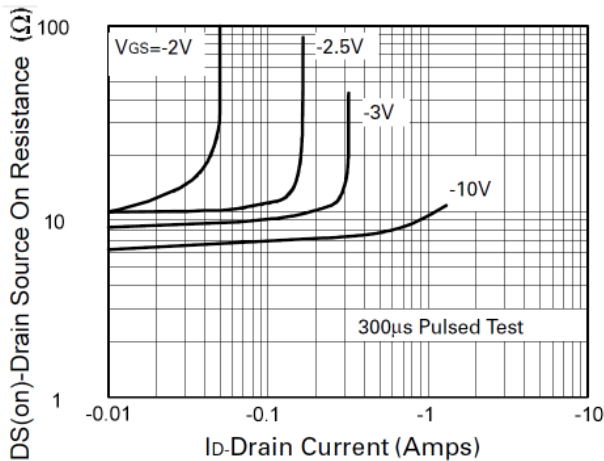
**Transfer Characteristics**



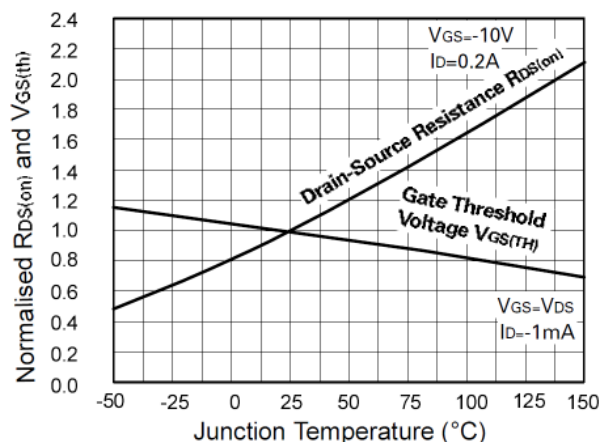
**Transconductance v drain current**



**Transconductance v gate-source voltage**



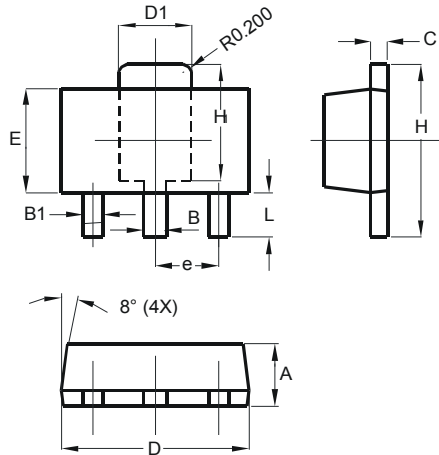
**On-resistance vs Drain Current**



**Normalised RDS(on) and VGS(th) vs Temperature**

## Package Outline Dimensions

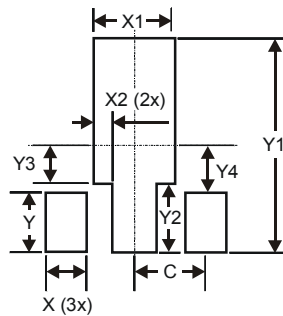
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



SOT89		
Dim	Min	Max
A	1.40	1.60
B	0.44	0.62
B1	0.35	0.54
C	0.35	0.44
D	4.40	4.60
D1	1.62	1.83
E	2.29	2.60
e	1.50 Typ	
H	3.94	4.25
H1	2.63	2.93
L	0.89	1.20
All Dimensions in mm		

## Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



Dimensions	Value (in mm)
X	0.900
X1	1.733
X2	0.416
Y	1.300
Y1	4.600
Y2	1.475
Y3	0.950
Y4	1.125
C	1.500

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