

**200V P-CHANNEL ENHANCEMENT MODE MOSFET**

### Product Summary

$BV_{DSS}$	$R_{DS(ON) MAX}$	$I_{D MAX}$ $T_A = +25^{\circ}C$
-200V	28Ω @ $V_{GS} = -10V$	-122mA

### Description

This new generation trench MOSFET features a unique structure combining the benefits of low on-resistance and fast switching, making it ideal for high-efficiency power management applications.

### Applications

- Active Clamping of Primary Side MOSFETs in 48V DC-DC Converters

### Features and Benefits

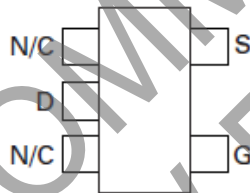
- High Voltage
- Low On-Resistance
- Fast Switching Speed
- Low Gate Drive
- Low Threshold
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)**
- Qualified to AEC-Q101 Standards for High Reliability**

### Mechanical Data

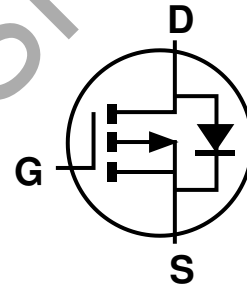
- Case: SOT25
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish (e3)
- Weight: 0.016 grams (Approximate)



Top View



Pin Out - Top View



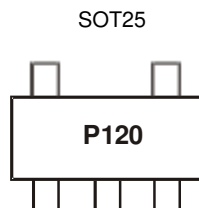
Equivalent Circuit

### Ordering Information (Note 4)

Part Number	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
ZXMP2120E5TA	P120	7	8	3,000

- Notes:
- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  - See [http://www.diodes.com/quality/lead\\_free/](http://www.diodes.com/quality/lead_free/) for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  - Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  - For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

### Marking Information



P120 = Product Type Marking Code

### Maximum Ratings (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DSS</sub>	-200	V
Gate-Source Voltage	V <sub>GSS</sub>	±20	V
Continuous Drain Current (V <sub>GS</sub> = -10V; T <sub>A</sub> = +25°C) (Note 5)	I <sub>D</sub>	-122	mA
Pulsed Drain Current (Note 6)	I <sub>DM</sub>	-0.7	A
Pulsed Source Current (Body Diode) (Note 6)	I <sub>SM</sub>	-0.7	A

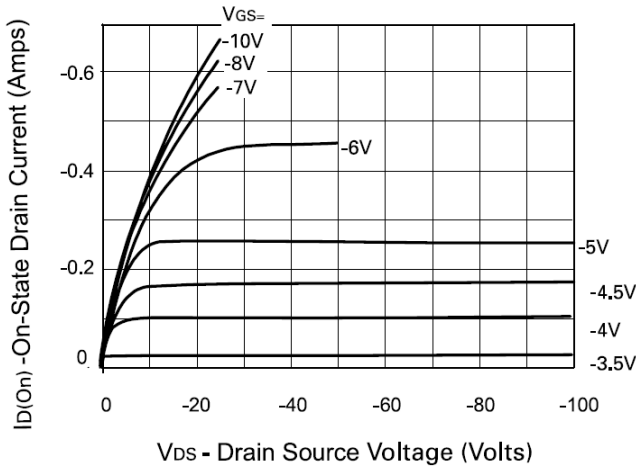
### Thermal Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation at T <sub>A</sub> = +25°C (Note 5)	P <sub>D</sub>	0.75	W
Linear Derating Factor		6	mW/°C
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	167	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

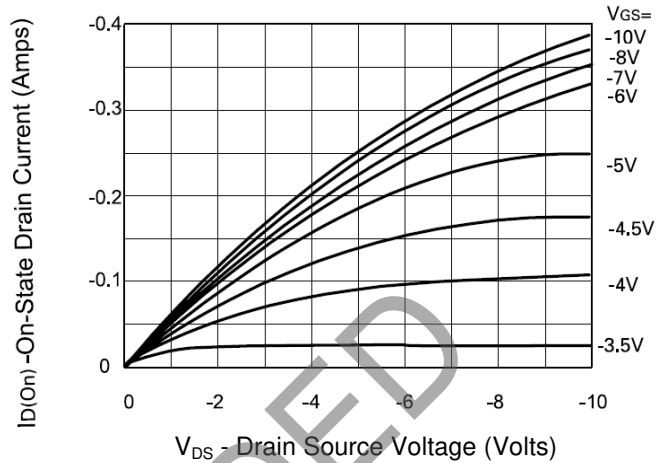
### Electrical Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-200	-	-	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -1mA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	-	-	-10 -100	µA	V <sub>DS</sub> = -200V, V <sub>GS</sub> = 0V V <sub>DS</sub> = -160V, V <sub>GS</sub> = 0V, T <sub>A</sub> = +125°C
Gate-Source Leakage	I <sub>GSS</sub>	-	-	20	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	-1.5	-	-3.5	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -1mA
Static Drain-Source On-Resistance (Note 7)	R <sub>DS(ON)</sub>	-	-	28	Ω	V <sub>GS</sub> = -10V, I <sub>D</sub> = -150mA
Forward Transconductance (Notes 7 & 8)	g <sub>fs</sub>	50	-	-	ms	V <sub>DS</sub> = -25V, I <sub>D</sub> = -150mA
On-State Drain Current (Note 7)	I <sub>D(ON)</sub>	-300	-	-	mA	V <sub>DS</sub> = -25V, V <sub>GS</sub> = -10V
<b>DYNAMIC CHARACTERISTICS</b>						
Input Capacitance (Note 8)	C <sub>iss</sub>	-	-	100	pF	V <sub>DS</sub> = -25V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance (Note 8)	C <sub>oss</sub>	-	-	25	pF	
Reverse Transfer Capacitance (Note 8)	C <sub>rss</sub>	-	-	7	pF	
Turn-On Delay Time (Notes 8 & 9)	t <sub>D(ON)</sub>	-	-	7	ns	V <sub>DD</sub> = -25V, I <sub>D</sub> = -150mA
Turn-On Rise Time (Notes 8 & 9)	t <sub>R</sub>	-	-	15	ns	
Turn-Off Delay Time (Notes 8 & 9)	t <sub>D(OFF)</sub>	-	-	12	ns	
Turn-Off Fall Time (Notes 8 & 9)	t <sub>F</sub>	-	-	15	ns	

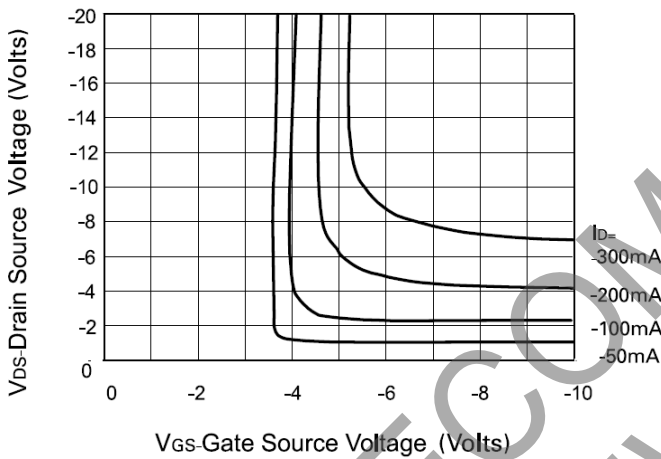
- Notes:
5. For a device surface mounted on 25mm x 25mm FR-4 PCB with high coverage of single sided 1oz copper, in still air conditions.
  6. Repetitive rating - pulse width limited by maximum junction temperature. Refer to Transient Thermal Impedance graph.
  7. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.
  8. Sample test.
  9. Switching characteristics are independent of operating junction temperature.



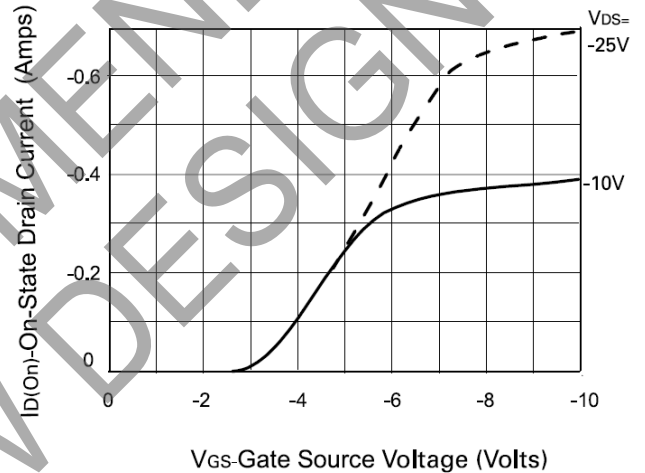
**Output Characteristics**



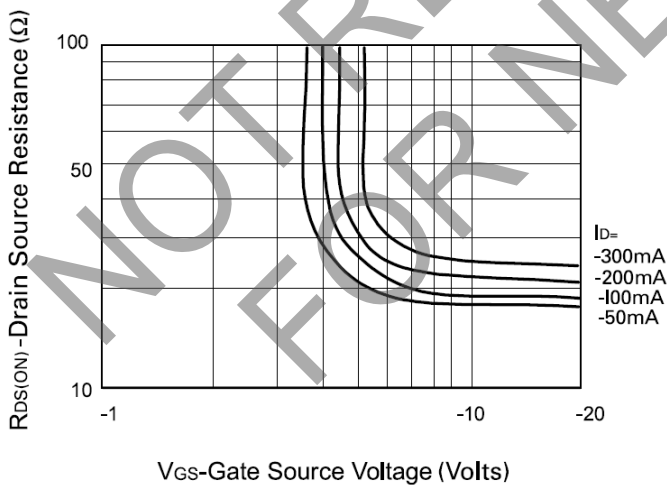
**Saturation Characteristics**



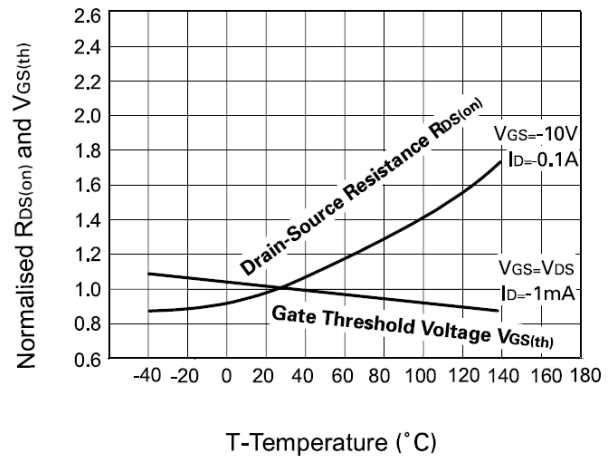
**Voltage Saturation Characteristics**



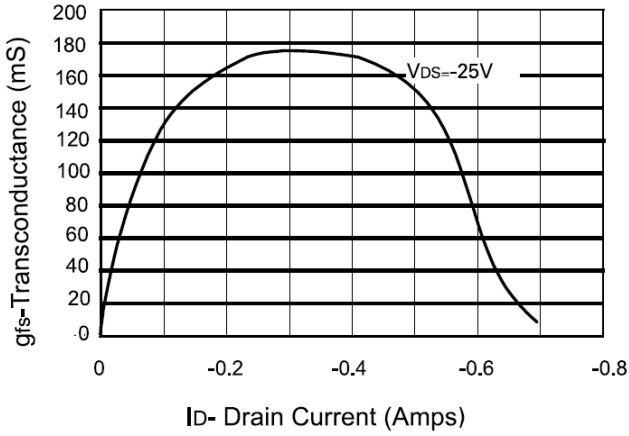
**Transfer Characteristics**



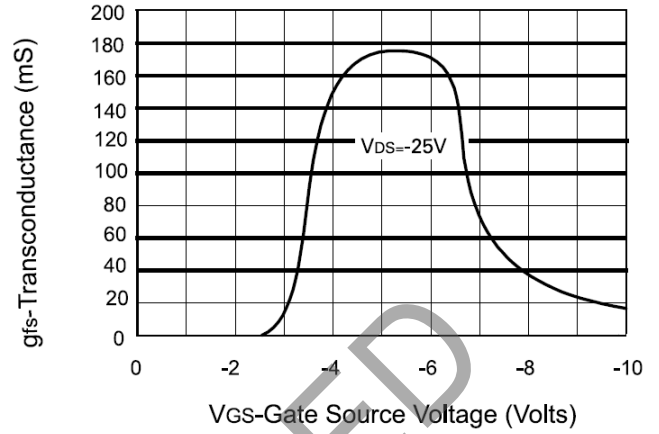
**On-resistance vs gate-source voltage**



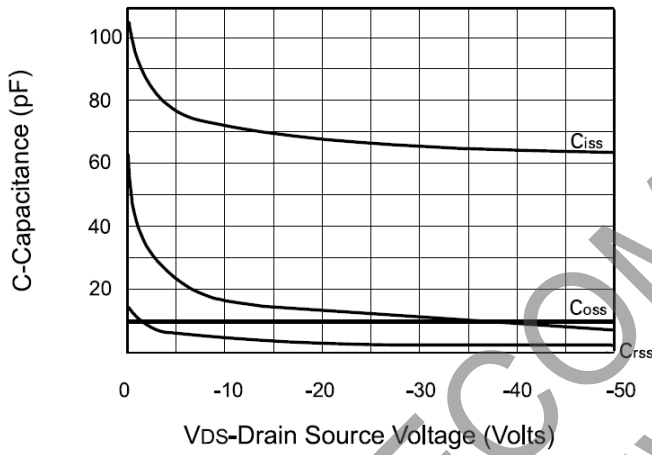
**Normalised  $R_{DS(on)}$  and  $V_{GS(th)}$  vs Temperature**



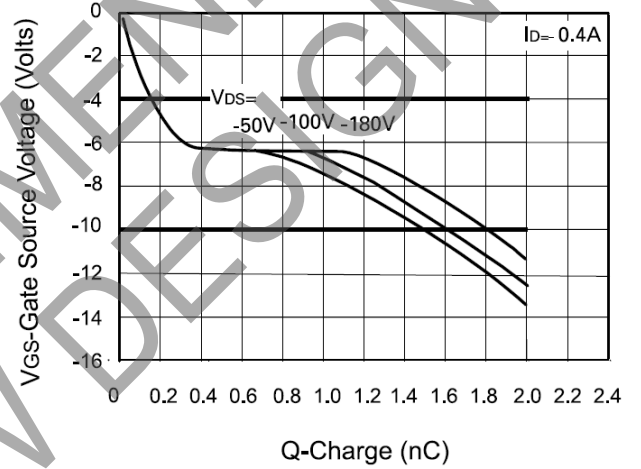
**Transconductance v drain current**



**Transconductance v gate-source voltage**



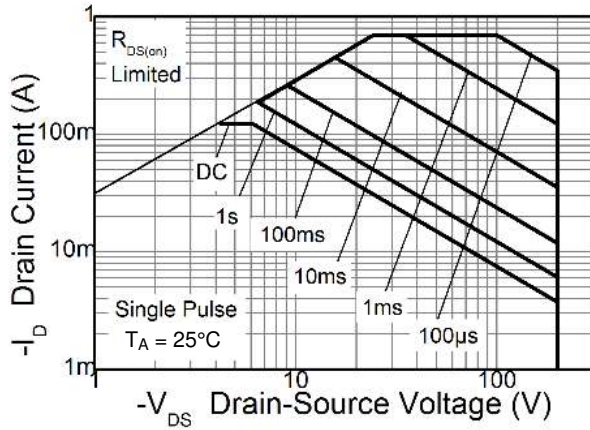
**Capacitance v drain-source voltage**



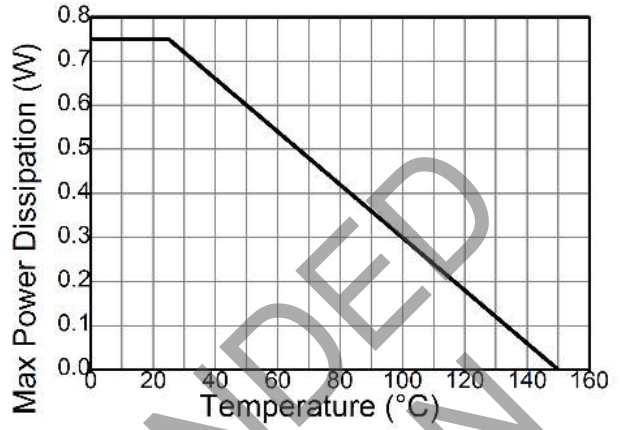
**Gate charge v gate-source voltage**

NOT RECOMMENDED FOR NEW DESIGN

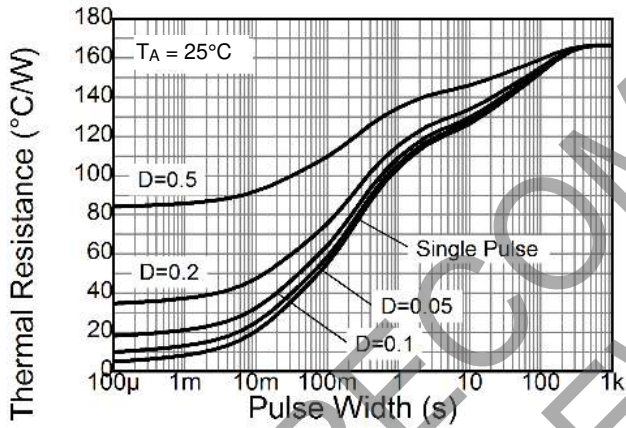
**Thermal Characteristics**



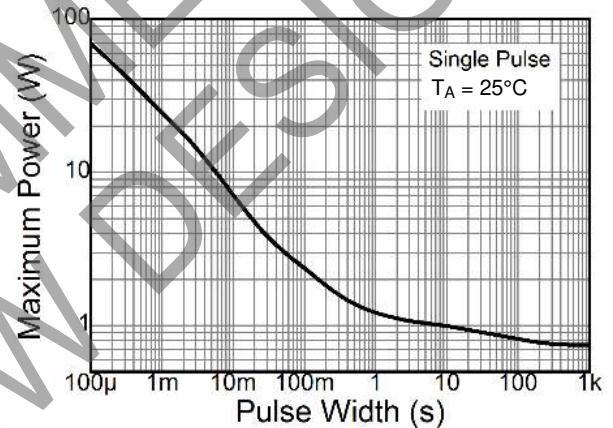
**Safe Operating Area**



**Derating Curve**



**Transient Thermal Impedance**

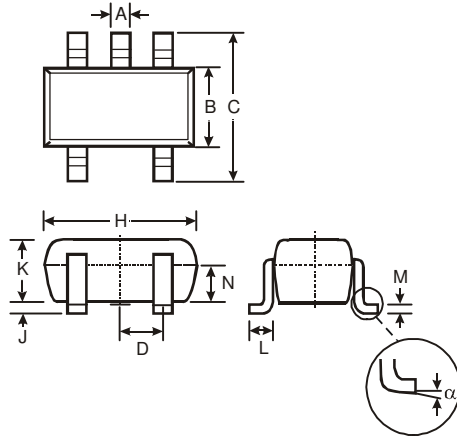


**Pulse Power Dissipation**

**Package Outline Dimensions**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT25

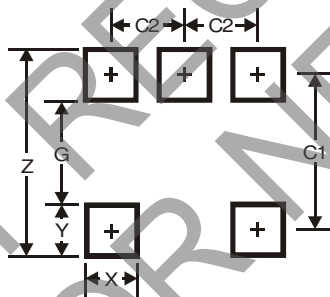


SOT25			
Dim	Min	Max	Typ
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D			0.95
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
N	0.70	0.80	0.75
α	0°	8°	-
All Dimensions in mm			

**Suggested Pad Layout**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT25



Dimensions	SOT25
Z	3.20
G	1.60
X	0.55
Y	0.80
C1	2.40
C2	0.95

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