ZXMP4A57E6

40V P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ max	I_D max T_A = +25°C
-40V	80mΩ @ V_{GS}= -10V	-3.7 A
	150mΩ @ V_{GS}= -4.5V	-2.8 A

Description

This MOSFET is designed to minimize the on-state resistance and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

Applications

- Motor Control
- DC-DC Converters
- Power Management Functions
- Uninterrupted Power Supply

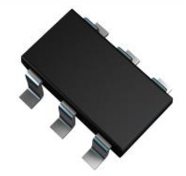
Features and Benefits

- Fast Switching Speed
- Low Gate Drive
- Low Input Capacitance
- **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)**

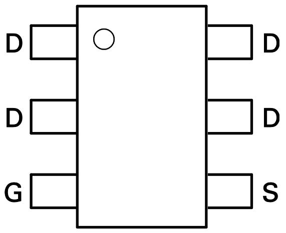
Mechanical Data

- Case: SOT26
- Case Material: Molded Plastic; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 ⓔ3
- Weight 0.018 grams (Approximate)

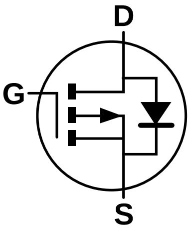
SOT26



Top View



Top View
Pin-Out



Equivalent Circuit

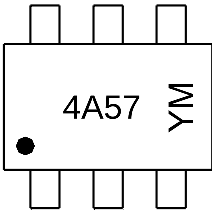
Ordering Information (Notes 4 & 5)

Part Number	Compliance	Case	Quantity per reel
ZXMP4A57E6TA	Standard	SOT26	3,000
ZXMP4A57E6QTA	Automotive	SOT26	3,000

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/quality/lead_free.html 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. For more information, please refer to http://www.diodes.com/quality/product_grade_definitions/.
5. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

Marking Information

SOT26



4A57 = Product Type Marking Code
YM = Date Code Marking
Y or $\overline{Y}$ = Year (ex: C = 2015)
M or $\overline{M}$ = Month (ex: 9 = September)

Date Code Key

Year	2015	2016	2017	2018	2019	2020	2021	2022
Code	C	D	E	F	G	H	I	J

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

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

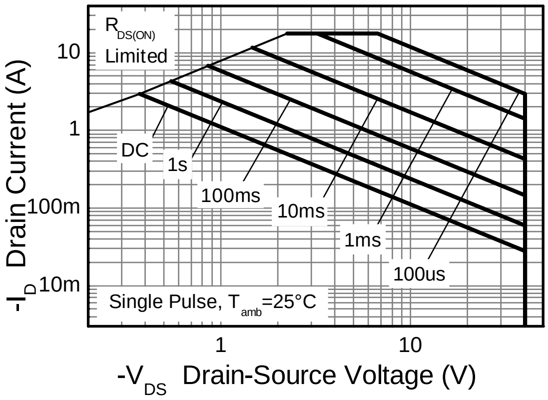
Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	-40	V
Gate-Source Voltage			V_{GS}	±20	V
Continuous Drain Current	V_{GS} = 10V	(Note 7)	I_D	-3.7	A
		T_A = +70°C (Note 7)		-2.9	
		(Note 6)		-2.9	
Pulsed Drain Current	V_{GS} = 10V	(Note 8)	I_{DM}	-18	A
Continuous Source Current (Body Diode)		(Note 7)	I_S	-2.6	A
Pulsed Source Current (Body Diode)		(Note 8)	I_{SM}	-18	A

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

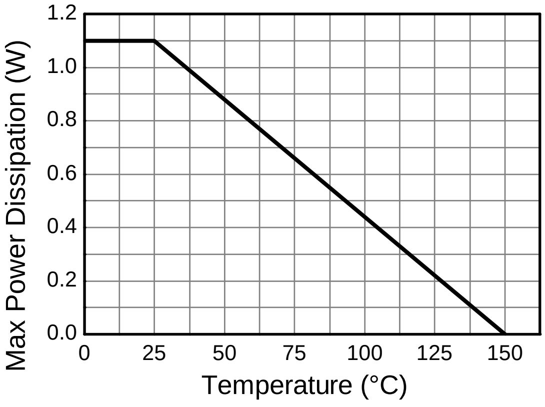
Characteristic		Symbol	Value	Unit
Power Dissipation Linear Derating Factor	(Note 6)	P_D	1.1 8.8	W mW/°C
	(Note 7)		1.7 13.7	
Thermal Resistance, Junction to Ambient	(Note 6)	$R_{\theta JA}$	113	°C/W
	(Note 7)		73	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Notes:
6. For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
7. Same as Note 4, except the device is measured at $t \leq 5$ seconds.
8. Same as Note 4, except the device is pulsed with D = 0.02 and pulse width 300µs. The pulse current is limited by the maximum junction temperature.

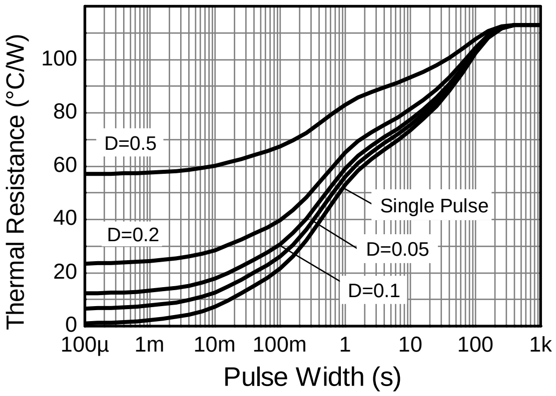
Thermal Characteristics



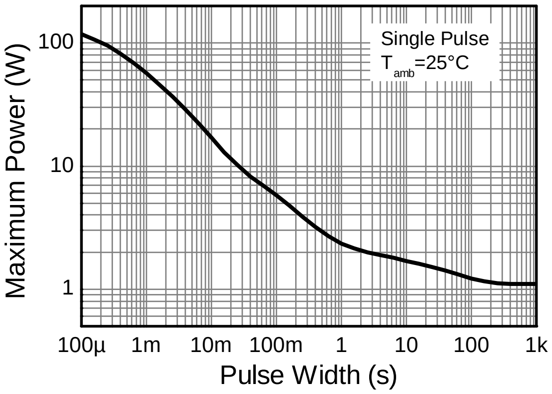
P-channel Safe Operating Area



Derating Curve



Transient Thermal Impedance



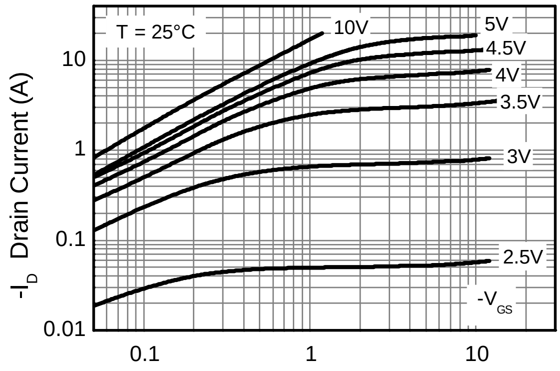
Pulse Power Dissipation

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

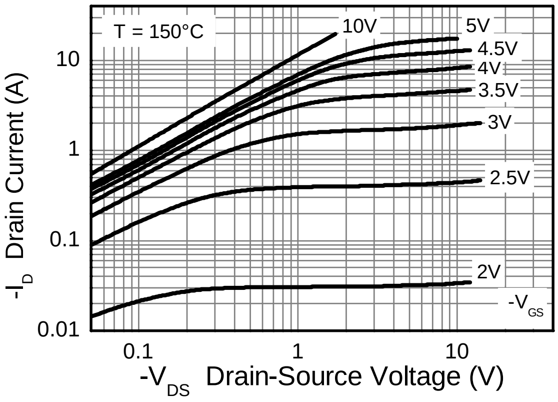
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition	
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage	BV_{DSS}	-40	—	—	V	I_D = -250µA, V_{GS} = 0V	
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-0.5	µA	V_{DS} = -40V, V_{GS} = 0V	
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V	
ON CHARACTERISTICS							
Gate Threshold Voltage	$V_{GS(th)}$	-1.0	—	-3.0	V	I_D = -250µA, V_{DS} = V_{GS}	
Static Drain-Source On-Resistance (Note 9)	$R_{DS(ON)}$	—	—	0.080	Ω	V_{GS} = -10V, I_D = -4A	
		—	—	0.150		V_{GS} = -4.5V, I_D = -2A	
Forward Transconductance (Notes 9 & 10)	g_{fs}	—	7.6	—	S	V_{DS} = -15V, I_D = -4A	
Diode Forward Voltage (Note 9)	V_{SD}	—	-0.86	-0.95	V	I_S = -4A, V_{GS} = 0V	
Reverse Recovery Time (Note 10)	t_{rr}	—	17.4	—	ns	I_S = -1.8A, di/dt = 100A/µs	
Reverse Recovery Charge (Note 10)	Q_{rr}	—	11.1	—	nC		
DYNAMIC CHARACTERISTICS (Note 10)							
Input Capacitance	C_{iss}	—	833	—	pF	V_{DS} = -20V, V_{GS} = 0V f = 1MHz	
Output Capacitance	C_{oss}	—	122	—			
Reverse Transfer Capacitance	C_{rss}	—	78	—			
Total Gate Charge (Note 11)	Q_g	—	7	—	nC	V_{GS} = -4.5V	V_{DS} = -20V I_D = -4A
Total Gate Charge (Note 11)	Q_g	—	15.8	—		V_{GS} = -10V	
Gate-Source Charge (Note 11)	Q_{gs}	—	3.6	—			
Gate-Drain Charge (Note 11)	Q_{gd}	—	2.7	—			
Turn-On Delay Time (Note 11)	$t_{D(on)}$	—	2.5	—	ns	V_{DD} = -20V, V_{GS} = -10V I_D = -1A, R_G ≅ 6.0Ω	
Turn-On Rise Time (Note 11)	t_r	—	3.3	—			
Turn-Off Delay Time (Note 11)	$t_{D(off)}$	—	47	—			
Turn-Off Fall Time (Note 11)	t_f	—	21	—			

Notes:
9. Measured under pulsed conditions. Pulse width ≤ 300µs; duty cycle ≤ 2%.
10. For design aid only, not subject to production testing.
11. Switching characteristics are independent of operating junction temperatures.

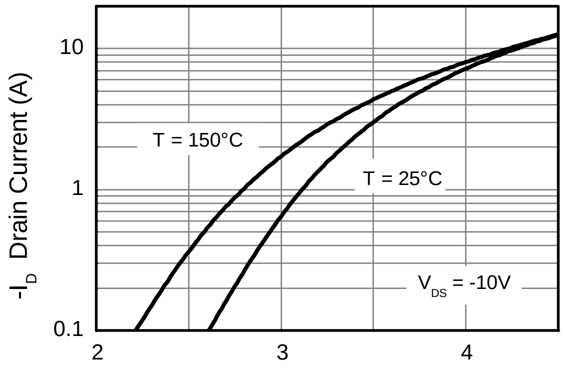
Typical Characteristics



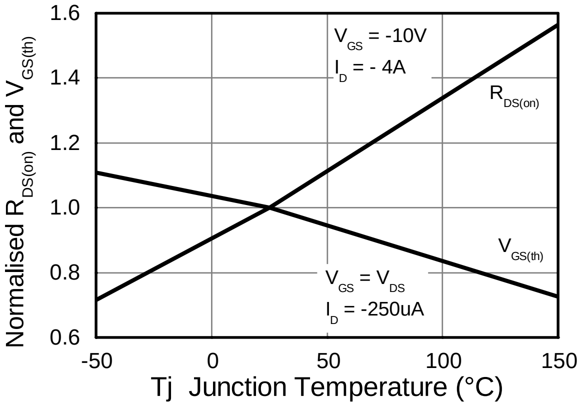
Output Characteristics



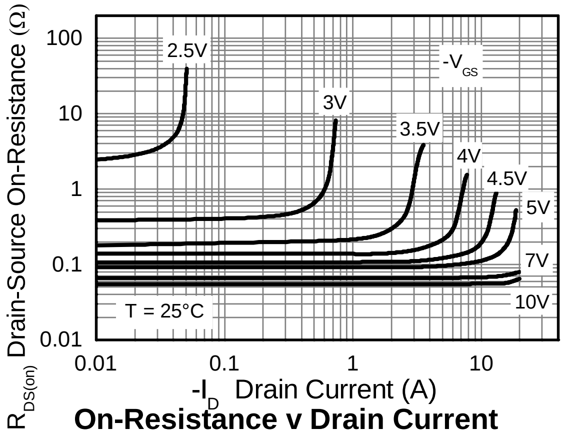
Output Characteristics



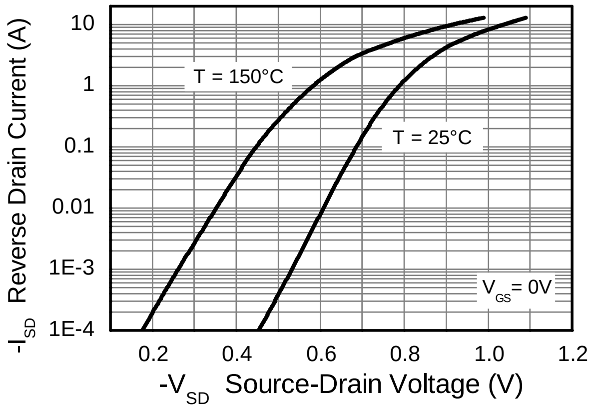
Typical Transfer Characteristics



Normalised Curves v Temperature

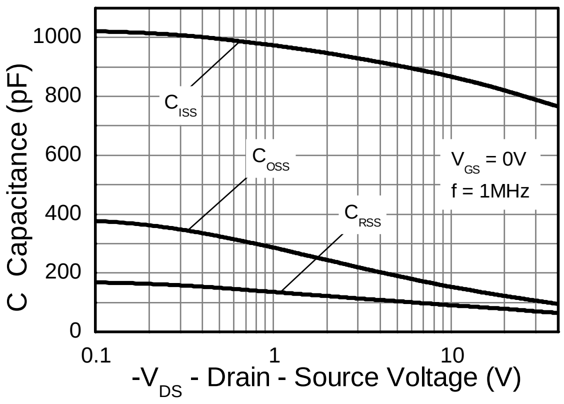


On-Resistance v Drain Current

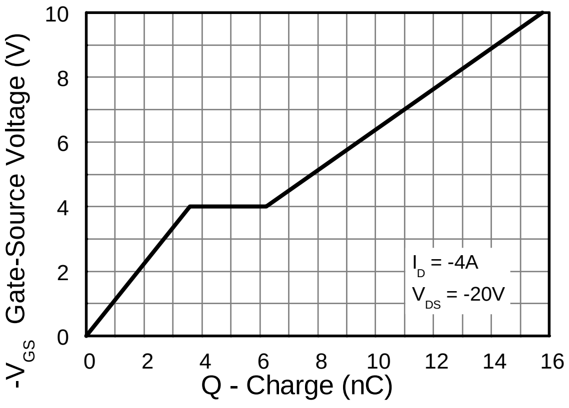


Source-Drain Diode Forward Voltage

Typical Characteristics (cont.)

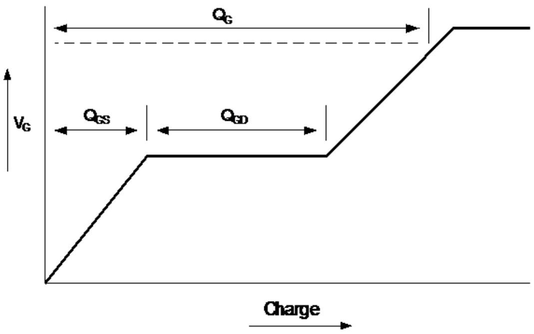


Capacitance v Drain-Source Voltage

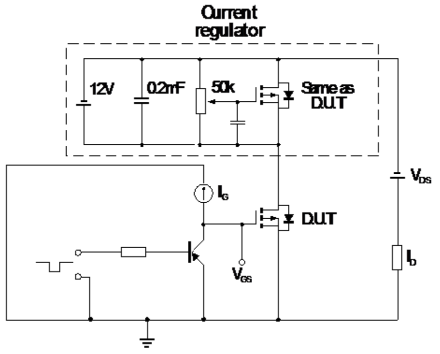


Gate-Source Voltage v Gate Charge

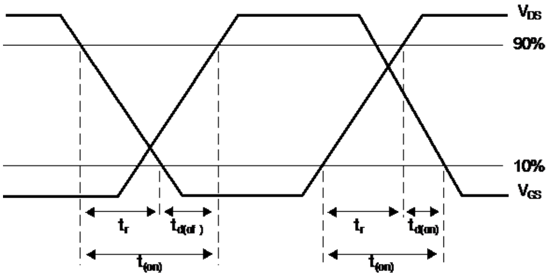
Test Circuits



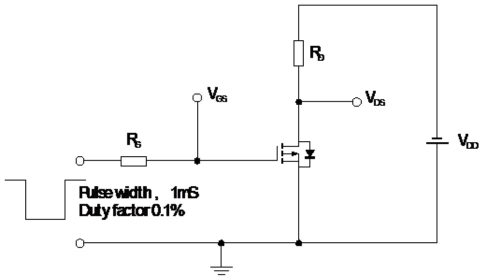
Basic gate charge waveform



Gate charge test circuit



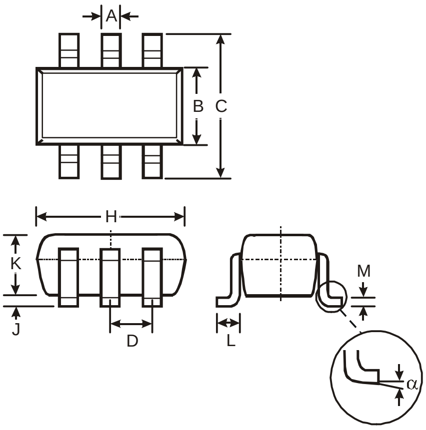
Switching time waveforms



Switching time test circuit

Package Outline Dimensions

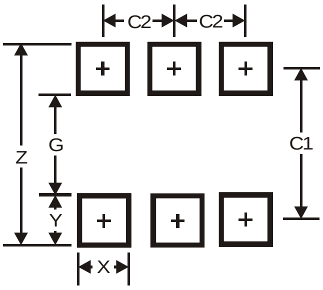
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



SOT26			
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
α	0°	8°	—
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)
Z	3.20
G	1.60
X	0.55
Y	0.80
C1	2.40
C2	0.95

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