

## Product Summary

$V_{(BR)DSS}$	$R_{DS(ON) \max}$	$I_D \max$ $T_A = +25^\circ\text{C}$
-40V	80m $\Omega$ @ $V_{GS} = -10\text{V}$	-3.7 A
	150m $\Omega$ @ $V_{GS} = -4.5\text{V}$	-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

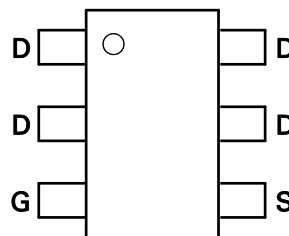
- Fast Switching Speed
- Low Gate Drive
- Low Input Capacitance
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

## Mechanical Data

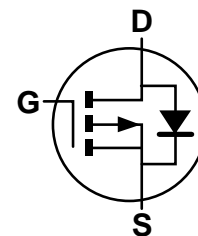
- Case: SOT26
- Case Material: Molded Plastic; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 @3
- Weight 0.018 grams (Approximate)



Top View



Top View  
Pin-Out



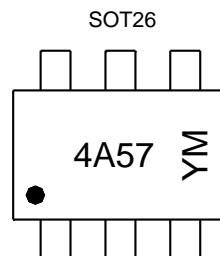
Equivalent Circuit

## 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](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/](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



4A57 = Product Type Marking Code  
 YM = Date Code Marking  
 Y or  $\bar{Y}$  = Year (ex: C = 2015)  
 M or  $\bar{M}$  = 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<sub>A</sub> = +25°C, unless otherwise specified.)

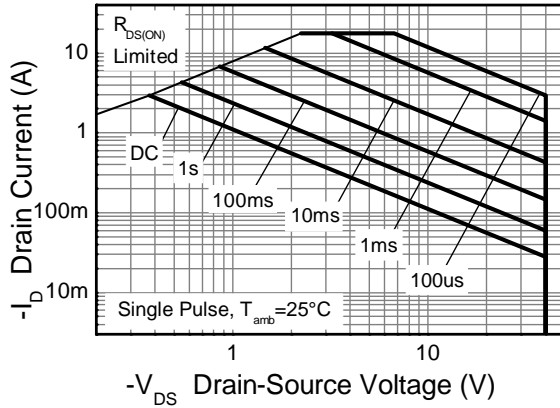
Characteristic			Symbol	Value	Unit	
Drain-Source Voltage			V <sub>DSS</sub>	-40	V	
Gate-Source Voltage			V <sub>GS</sub>	±20	V	
Continuous Drain Current	V <sub>GS</sub> = 10V	(Note 7)	I <sub>D</sub>	-3.7	A	
		T <sub>A</sub> = +70°C (Note 7)		-2.9		
		(Note 6)		-2.9		
Pulsed Drain Current	V <sub>GS</sub> = 10V	(Note 8)	I <sub>DM</sub>	-18	A	
Continuous Source Current (Body Diode)			(Note 7)	I <sub>S</sub>	-2.6	A
Pulsed Source Current (Body Diode)			(Note 8)	I <sub>SM</sub>	-18	A

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

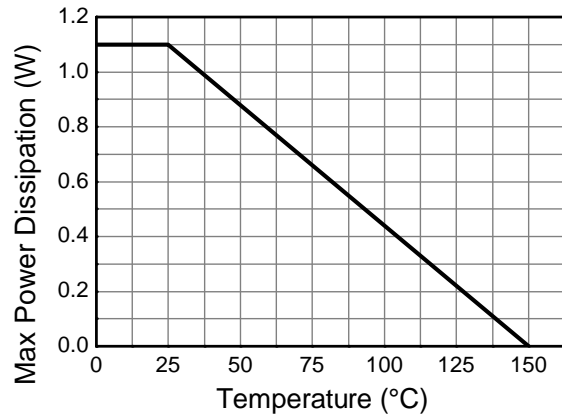
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 6)	P <sub>D</sub>	1.1	W
			8.8	
Linear Derating Factor	(Note 7)		1.7	mW/°C
			13.7	
Thermal Resistance, Junction to Ambient	(Note 6)	R <sub>θJA</sub>	113	°C/W
	(Note 7)		73	
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-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 ≤ 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.

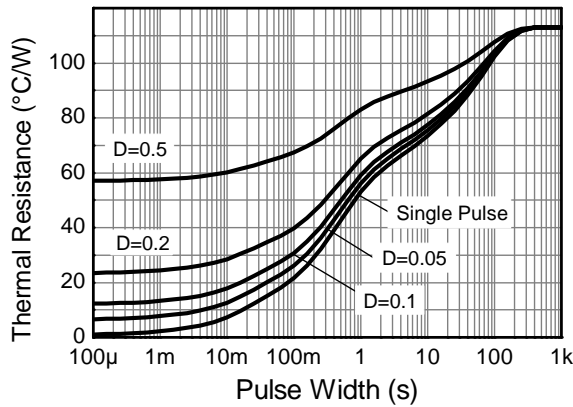
**Thermal Characteristics**



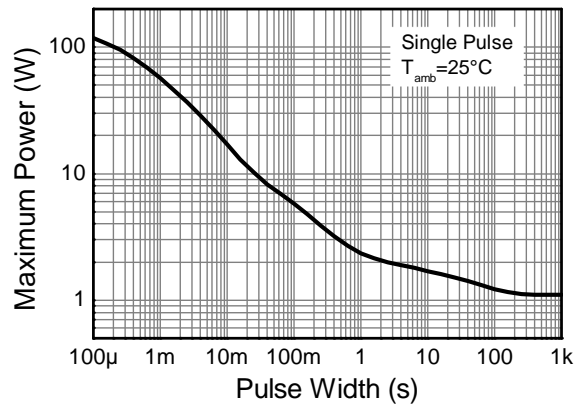
**P-channel Safe Operating Area**



**Derating Curve**



**Transient Thermal Impedance**



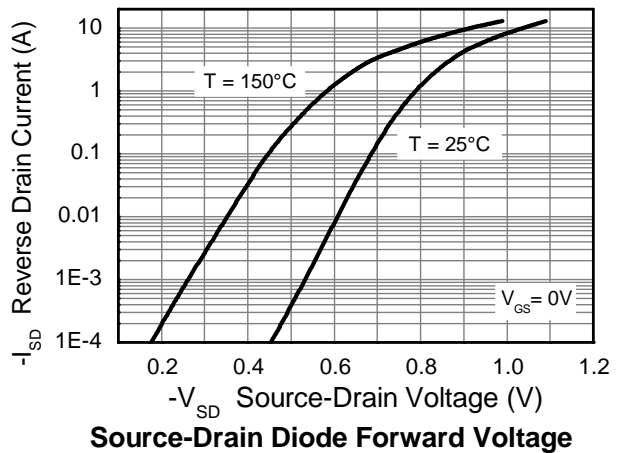
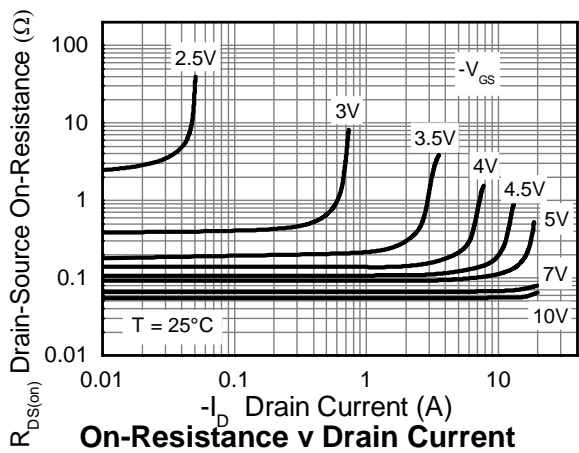
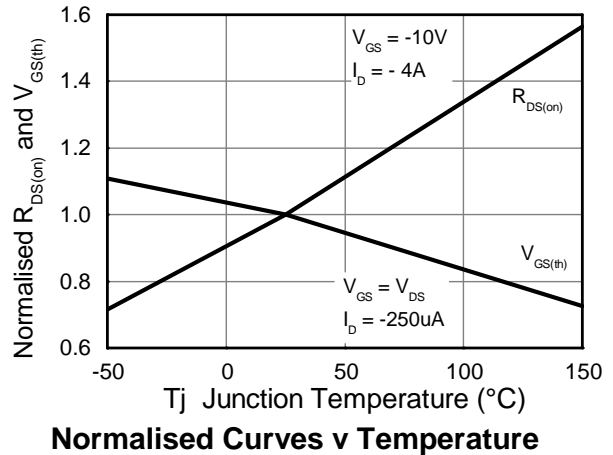
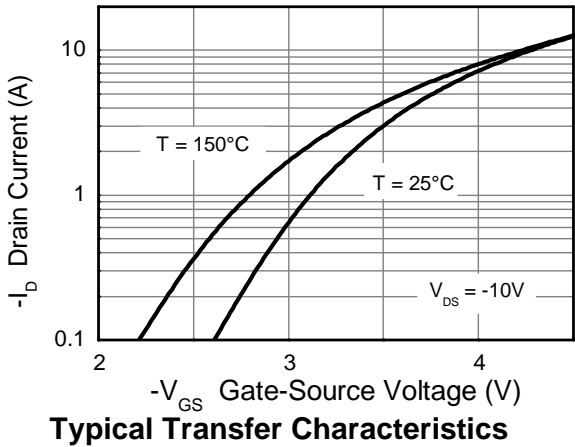
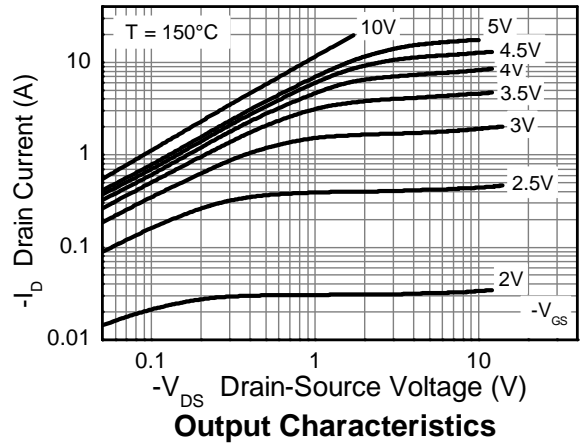
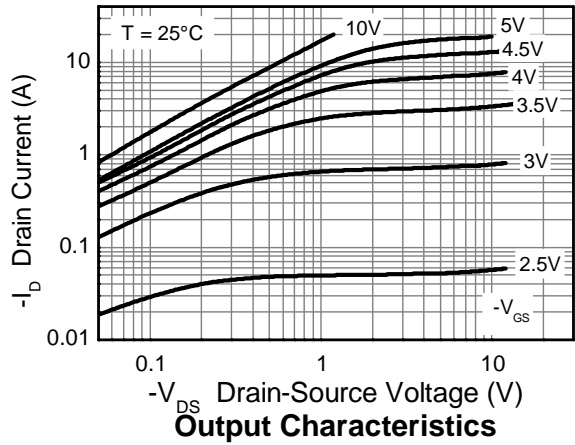
**Pulse Power Dissipation**

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

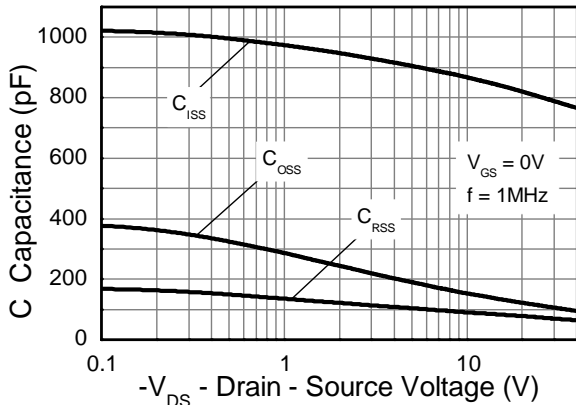
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-40	—	—	V	I <sub>D</sub> = -250μA, V <sub>GS</sub> = 0V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	-0.5	μA	V <sub>DS</sub> = -40V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	-1.0	—	-3.0	V	I <sub>D</sub> = -250μA, V <sub>DS</sub> = V <sub>GS</sub>
Static Drain-Source On-Resistance (Note 9)	R <sub>DS(ON)</sub>	—	—	0.080	Ω	V <sub>GS</sub> = -10V, I <sub>D</sub> = -4A
		—	—	0.150		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -2A
Forward Transconductance (Notes 9 & 10)	g <sub>fs</sub>	—	7.6	—	S	V <sub>DS</sub> = -15V, I <sub>D</sub> = -4A
Diode Forward Voltage (Note 9)	V <sub>SD</sub>	—	-0.86	-0.95	V	I <sub>S</sub> = -4A, V <sub>GS</sub> = 0V
Reverse Recovery Time (Note 10)	t <sub>rr</sub>	—	17.4	—	ns	I <sub>S</sub> = -1.8A, di/dt = 100A/μs
Reverse Recovery Charge (Note 10)	Q <sub>rr</sub>	—	11.1	—	nC	
<b>DYNAMIC CHARACTERISTICS (Note 10)</b>						
Input Capacitance	C <sub>iss</sub>	—	833	—	pF	V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V f = 1MHz
Output Capacitance	C <sub>oss</sub>	—	122	—		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	78	—		
Total Gate Charge (Note 11)	Q <sub>g</sub>	—	7	—	nC	V <sub>GS</sub> = -4.5V V <sub>GS</sub> = -10V V <sub>DS</sub> = -20V I <sub>D</sub> = -4A
Total Gate Charge (Note 11)	Q <sub>g</sub>	—	15.8	—		
Gate-Source Charge (Note 11)	Q <sub>gs</sub>	—	3.6	—		
Gate-Drain Charge (Note 11)	Q <sub>gd</sub>	—	2.7	—		
Turn-On Delay Time (Note 11)	t <sub>D(on)</sub>	—	2.5	—	ns	V <sub>DD</sub> = -20V, V <sub>GS</sub> = -10V I <sub>D</sub> = -1A, R <sub>G</sub> = 6.0Ω
Turn-On Rise Time (Note 11)	t <sub>r</sub>	—	3.3	—		
Turn-Off Delay Time (Note 11)	t <sub>D(off)</sub>	—	47	—		
Turn-Off Fall Time (Note 11)	t <sub>f</sub>	—	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.

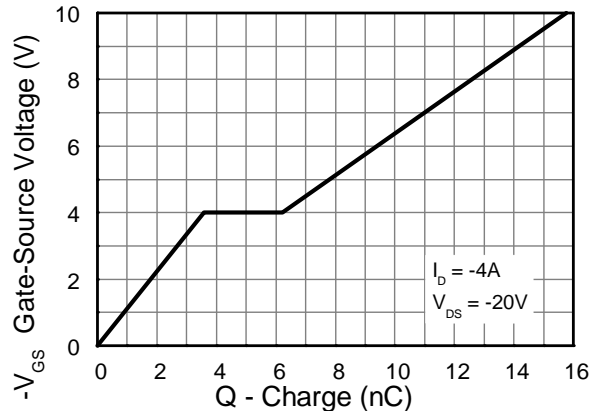
**Typical Characteristics**



**Typical Characteristics (cont.)**

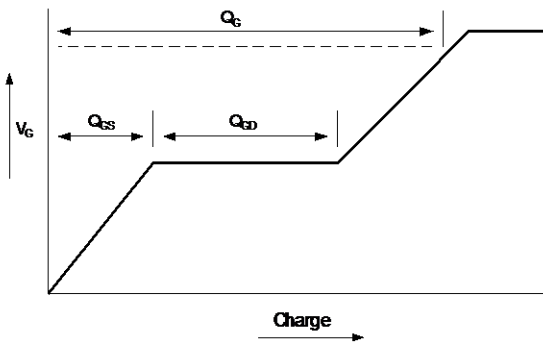


**Capacitance v Drain-Source Voltage**

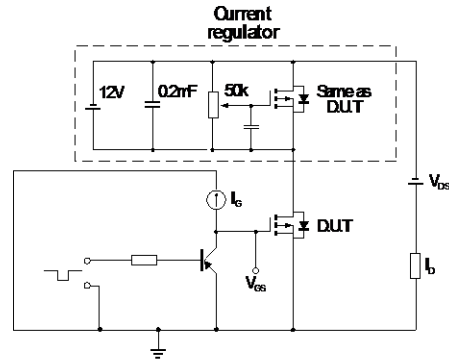


**Gate-Source Voltage v Gate Charge**

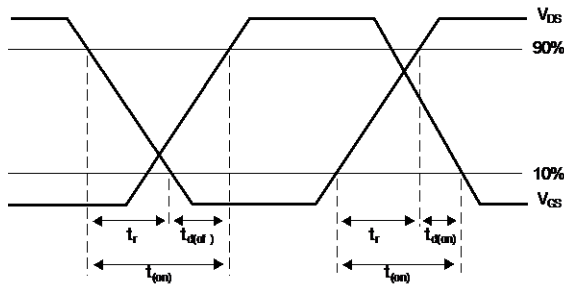
**Test Circuits**



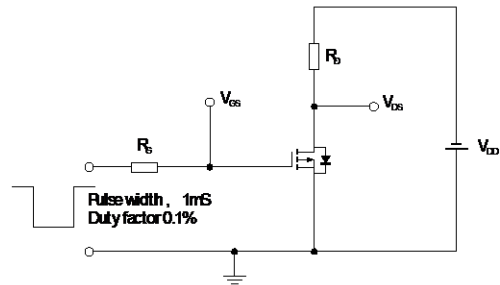
**Basic gate charge waveform**



**Gate charge test circuit**



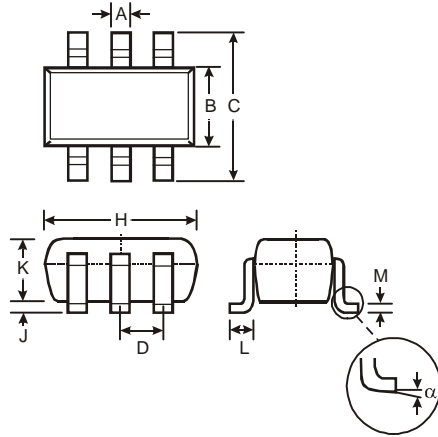
**Switching time waveforms**



**Switching time test circuit**

**Package Outline Dimensions**

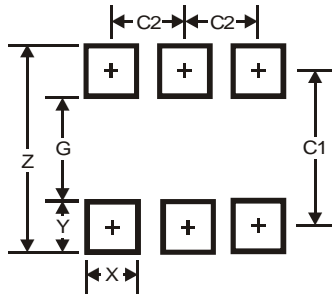
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



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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