

Product Summary

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

Description

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

Applications

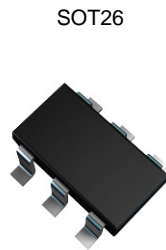
- Motor Control
- DC-DC Converters
- Power Management Functions
- Uninterrupted Power Supply

Features and Benefits

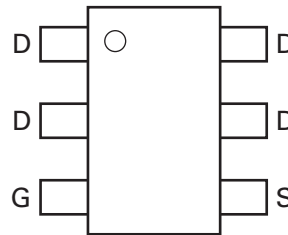
- Fast switching speed
- Low gate drive
- Low input capacitance
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

Mechanical Data

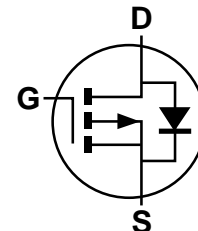
- Case: SOT26
- Case Material: Molded Plastic, UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin annealed over Copper lead frame. Solderable per MIL-STD-202, Method 208 **e3**
- Weight 0.018 grams (approximate)



Top View



Top View
Pin-Out



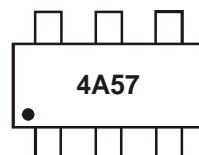
Equivalent Circuit

Ordering Information (Note 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



4A57 = Product Type Marking Code

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

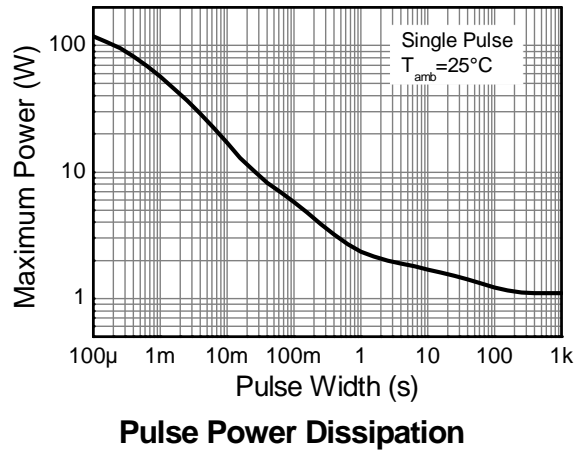
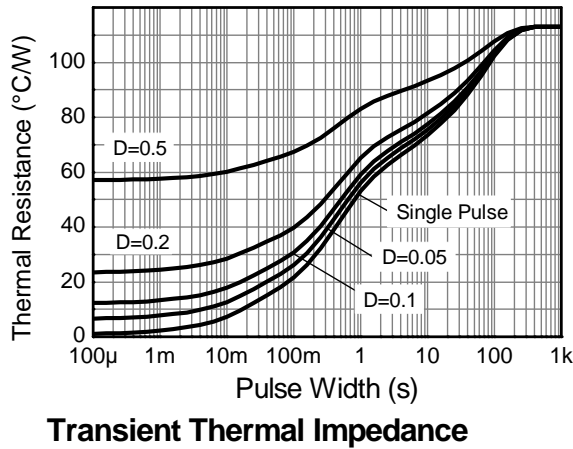
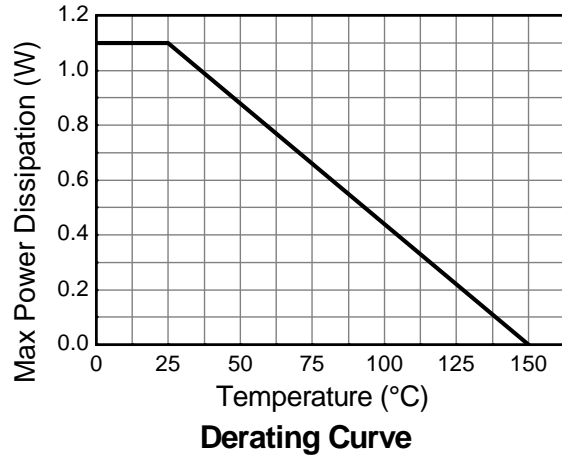
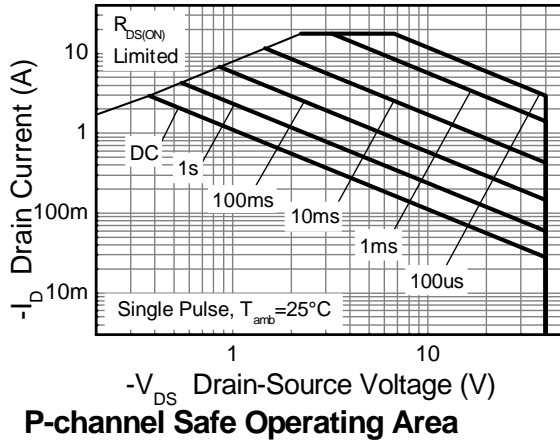
Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	-40	V
Gate-Source Voltage			V_{GS}	± 20	V
Continuous Drain Current	$V_{GS} = 10\text{V}$	(Note 7)	I_D	-3.7	A
		$T_A = +70^\circ\text{C}$ (Note 7)		-2.9	
		(Note 6)		-2.9	
Pulsed Drain current	$V_{GS} = 10\text{V}$	(Note 8)	I_{DM}	-18	A
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 (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Power dissipation Linear derating factor	(Note 6)	P_D	1.1	W mW/ $^\circ\text{C}$
			8.8	
	(Note 7)		1.7 13.7	
Thermal Resistance, Junction to Ambient	(Note 6)	$R_{\theta JA}$	113	$^\circ\text{C/W}$
	(Note 7)		73	
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 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 $t \leq 5$ sec.
 8. Same as note (4), except the device is pulsed with $D = 0.02$ and pulse width 300 μs . The pulse current is limited by the maximum junction temperature.

Thermal Characteristics

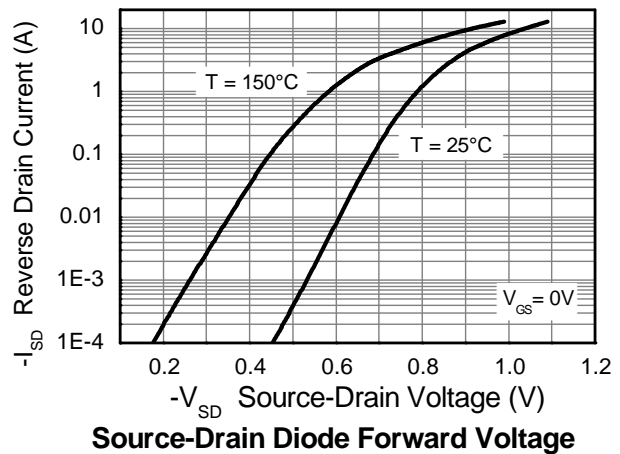
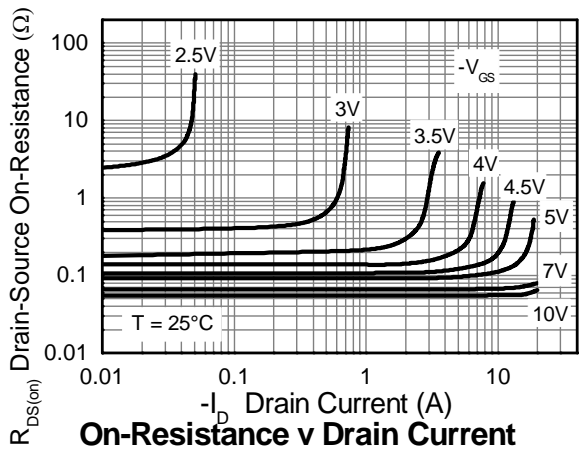
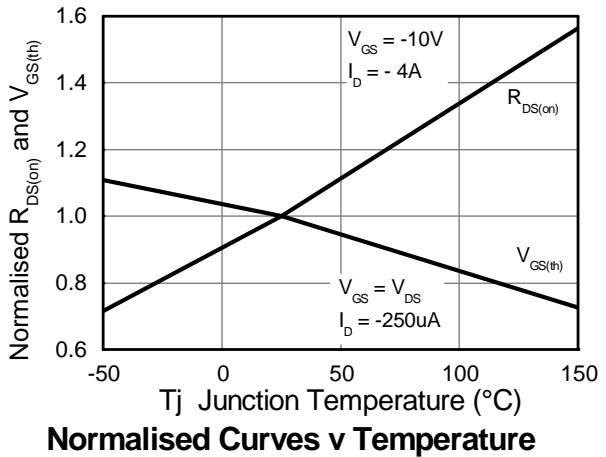
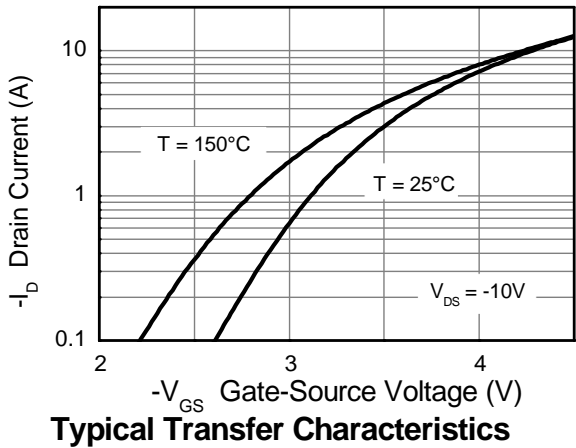
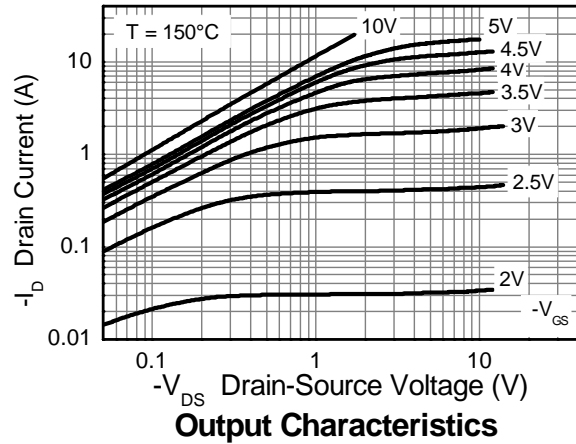
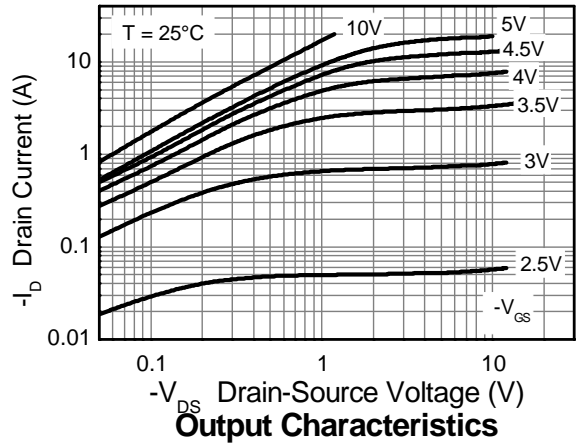


Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

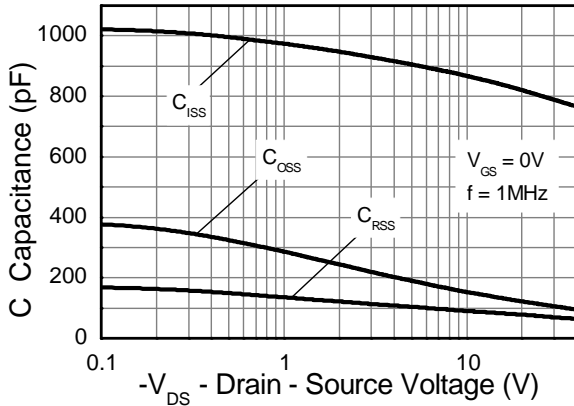
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition	
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage	BV _{DSS}	-40	—	—	V	I _D = -250μA, V _{GS} = 0V	
Zero Gate Voltage Drain Current	I _{DSS}	—	—	-0.5	μA	V _{DS} = -40V, V _{GS} = 0V	
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, 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	
Total Gate Charge (Note 11)	Q _g	—	15.8	—		V _{GS} = -10V	V _{DS} = -20V I _D = -4A
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.

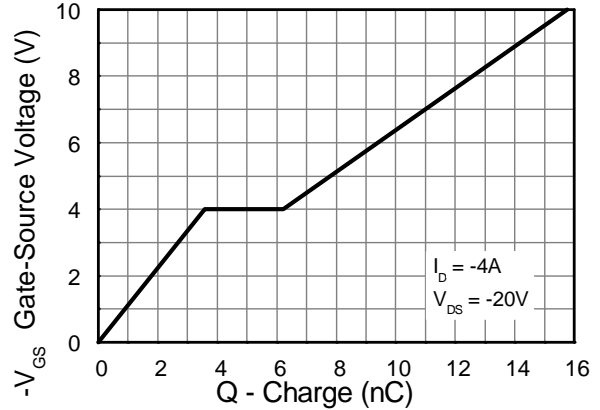
Typical Characteristics



Typical Characteristics (cont.)

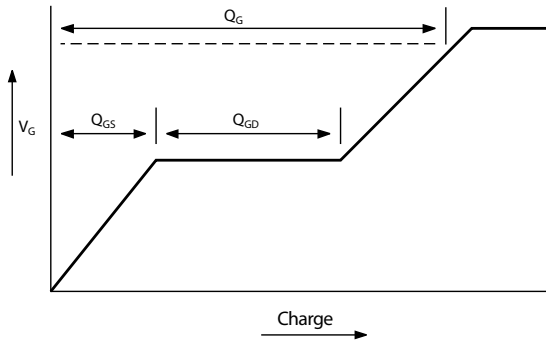


Capacitance v Drain-Source Voltage

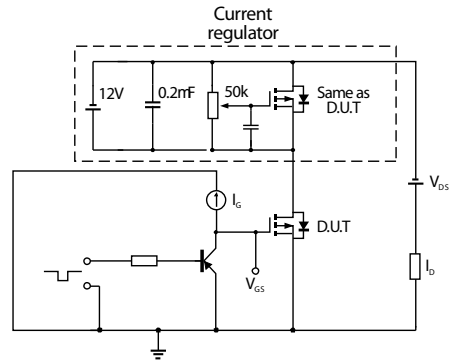


Gate-Source Voltage v Gate Charge

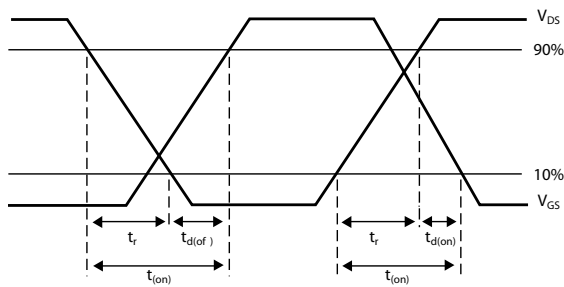
Test Circuits



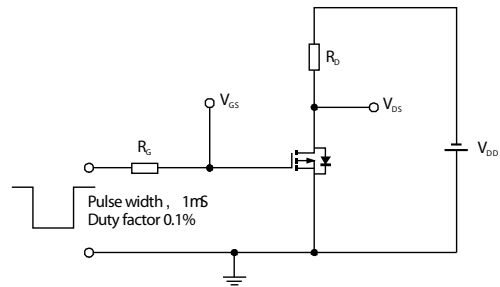
Basic gate charge waveform



Gate charge test circuit



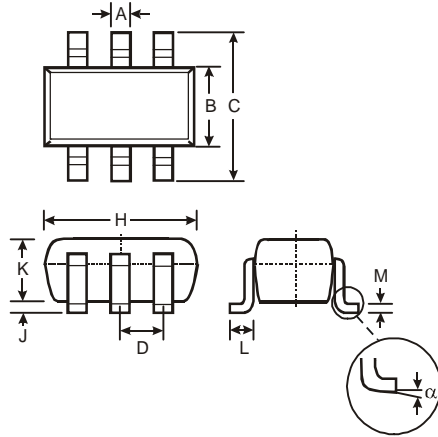
Switching time waveforms



Switching time test circuit

Package Outline Dimensions

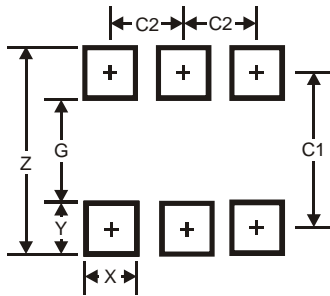
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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 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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