

Product Summary

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

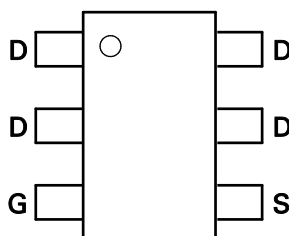
- Fast Switching Speed
- Low Gate Drive
- Low Input Capacitance
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

Mechanical Data

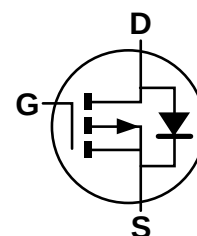
- Case: SOT26
- Case Material: Molded Plastic; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 **Ⓔ3**
- Weight 0.018 grams (Approximate)



Top View



Top View
Pin-Out



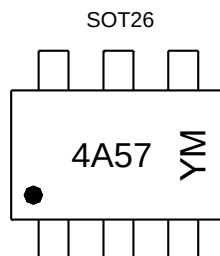
Equivalent Circuit

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 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
 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.)

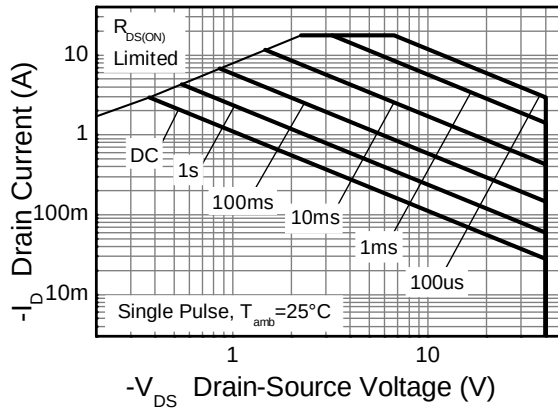
Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V _{DSS}	-40	V
Gate-Source Voltage			V _{GS}	±20	V
Continuous Drain Current	V _{GS} = 10V	(Note 7)	I _D	-3.7	A
		T _A = +70°C (Note 7)		-2.9	
		(Note 6)		-2.9	
Pulsed Drain Current	V _{GS} = 10V	(Note 8)	I _{DM}	-18	A
Continuous Source Current (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.)

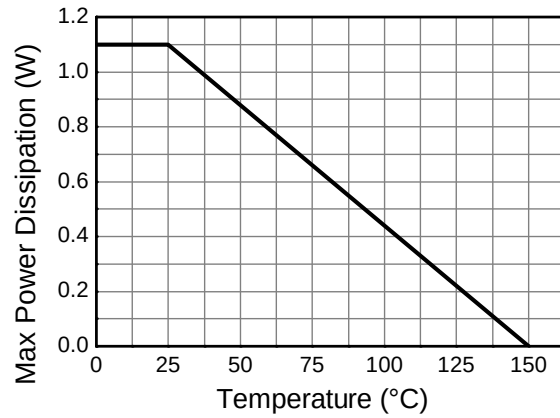
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 6)	P _D	1.1	W
			8.8	
Linear Derating Factor	(Note 7)		1.7	mW/°C
			13.7	
Thermal Resistance, Junction to Ambient	(Note 6)	R _{θJA}	113	°C/W
	(Note 7)		73	
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

- 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 ≤ 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.

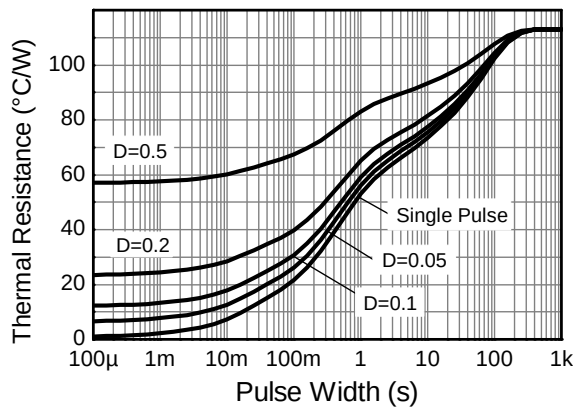
Thermal Characteristics



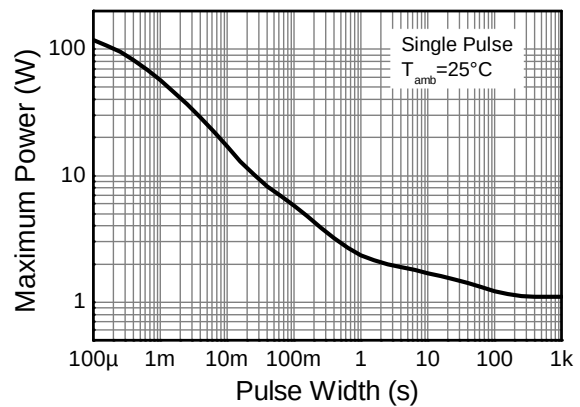
P-channel Safe Operating Area



Derating Curve



Transient Thermal Impedance



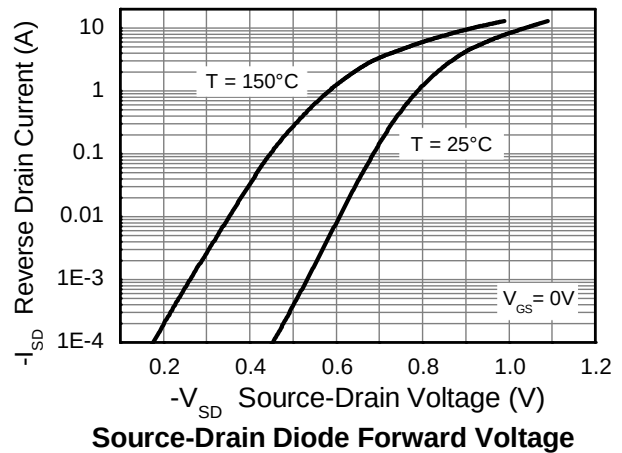
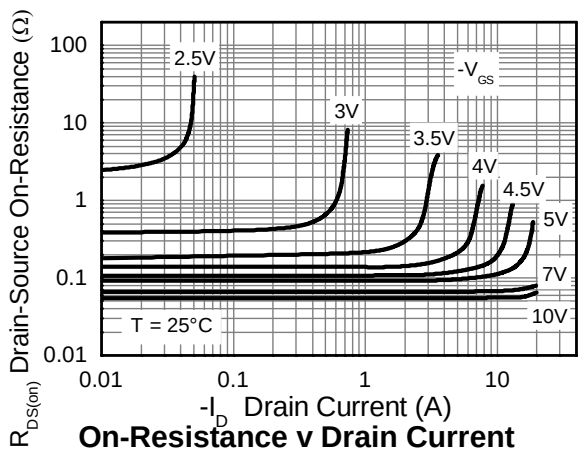
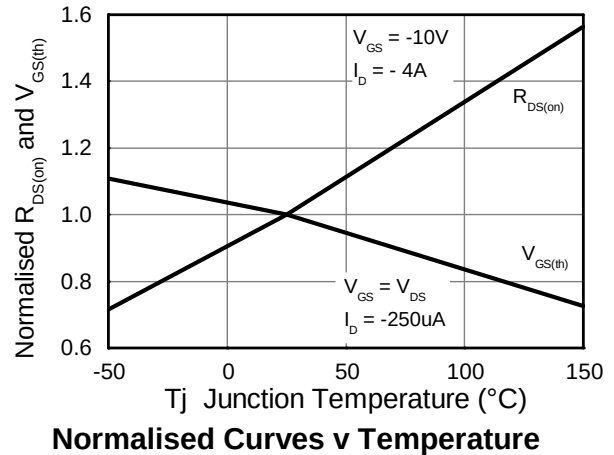
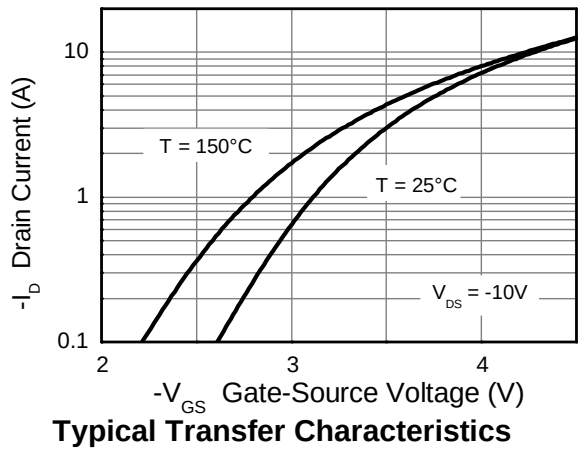
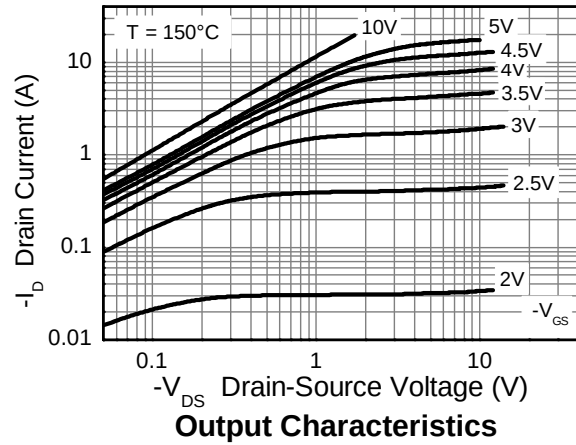
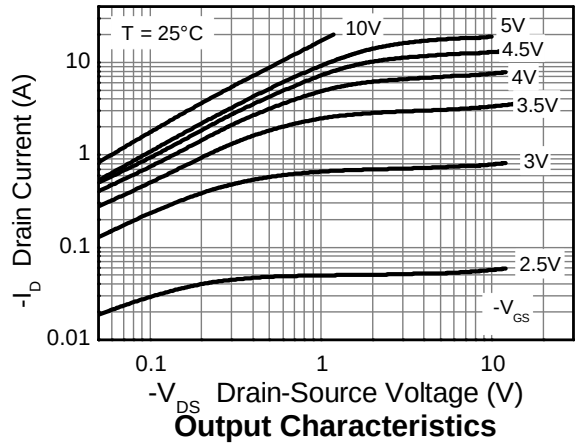
Pulse Power Dissipation

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

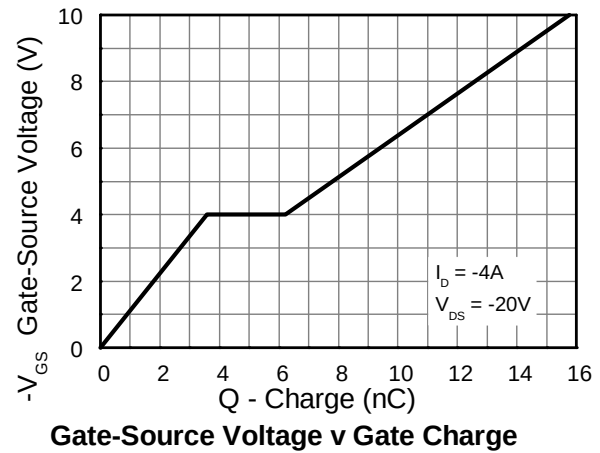
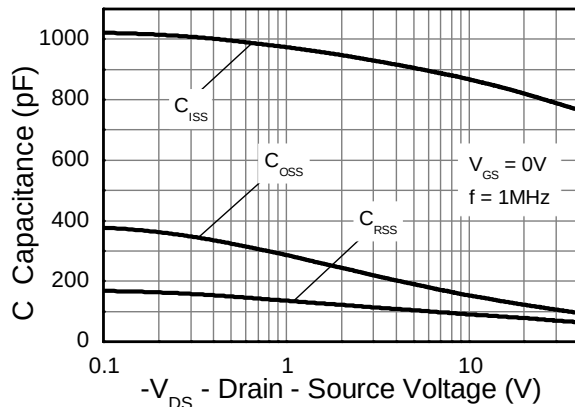
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition	
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage	BV _{DSS}	-40	—	—	V	I _D = -250μA, V _{GS} = 0V	
Zero Gate Voltage Drain Current	I _{DSS}	—	—	-0.5	μA	V _{DS} = -40V, V _{GS} = 0V	
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, 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.

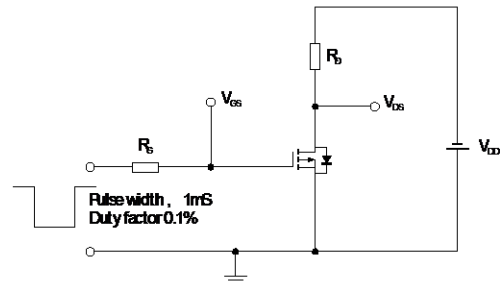
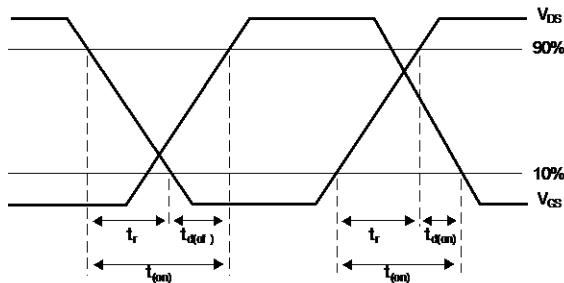
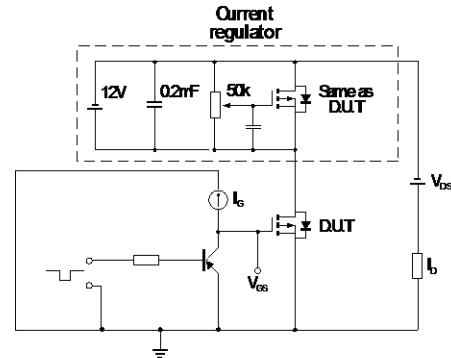
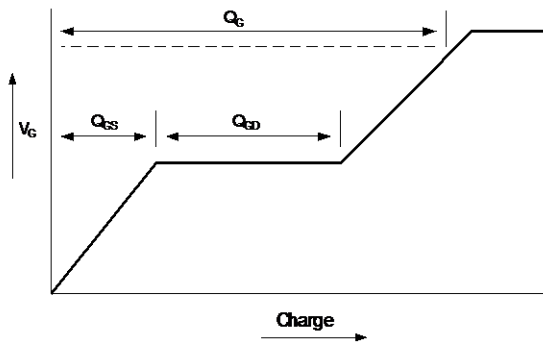
Typical Characteristics



Typical Characteristics (cont.)

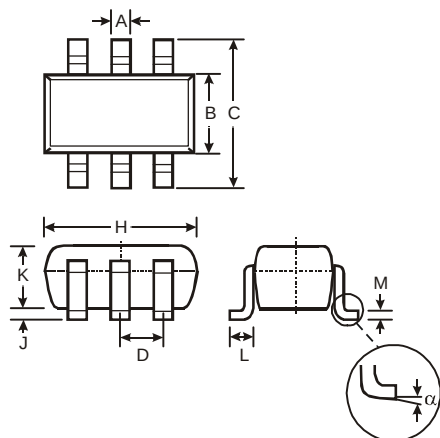


Test Circuits



Package Outline Dimensions

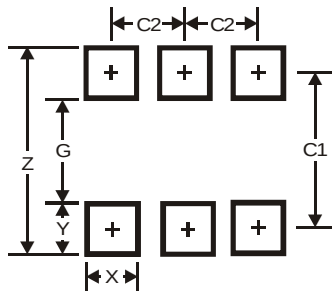
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



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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