60V P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$ Max	I_D Max T_A = +25°C (Note 7)
-60V	125mΩ @ V_{GS} = -10V	-3.0 A
	190mΩ @ V_{GS} = -4.5V	-2.4 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

- DC-DC Converters
- Power Management Functions
- Disconnect Switches
- Motor Control

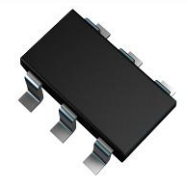
Features and Benefits

- Low On-Resistance
- Fast Switching Speed
- Low Threshold
- 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 Available (Note 4)**

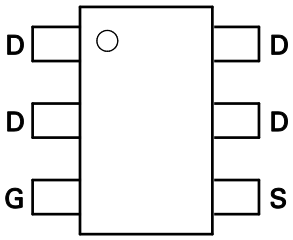
Mechanical Data

- Case: SOT26
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See Diagram Below
- Terminals: Finish - Matte Tin Annealed over Copper Leadframe; Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.018 grams (Approximate)

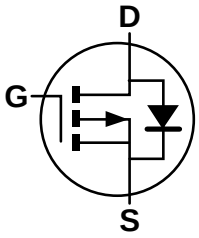
SOT26



Top View



Pin Out - Top View



Equivalent Circuit

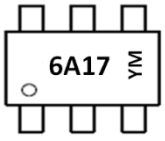
Ordering Information (Notes 4 & 5)

Part Number	Compliance	Case	Quantity per reel
ZXMP6A17E6QTA	Automotive	SOT26	3,000

Note:
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



6A17 = 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	2023	2024	2025	2026
Code	C	D	E	F	G	H	I	J	K	L	M	N

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

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	-60	V
Gate-Source Voltage			V_{GS}	±20	V
Continuous Drain Current	V_{GS} = 10V	(Note 7)	I_D	-3.0	A
		T_A = +70°C (Note 7)		-2.4	
		(Note 6)		-2.3	
Pulsed Drain Current	V_{GS} = 10V	(Note 8)	I_{DM}	-13.6	A
Continuous Source Current (Body Diode)		(Note 7)	I_S	-2.5	A
Pulsed Source Current (Body Diode)		(Note 8)	I_{SM}	-13.6	A

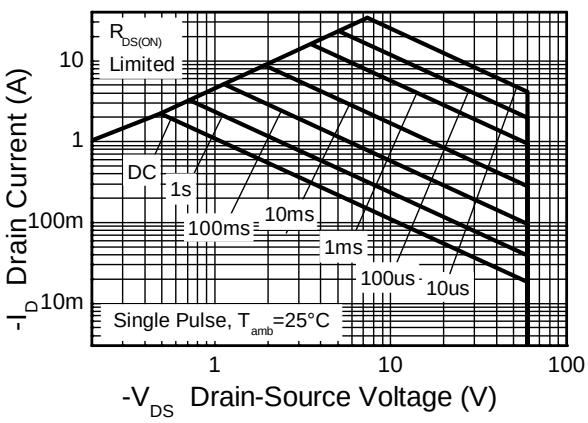
Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 6)	P_D	1.1	W
Linear Derating factor			8.8	mW/°C
	(Note 7)		1.92	W
			15.4	mW/°C
Thermal Resistance, Junction to Ambient	(Note 6)	$R_{\theta JA}$	113	°C/W
	(Note 7)		65	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

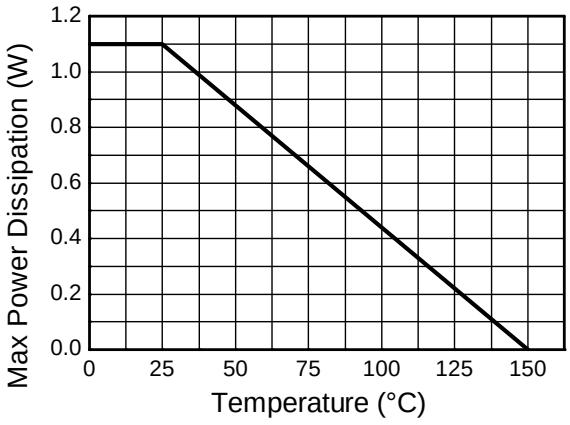
Notes:
6. For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
7. Same as Note 6, except the device is measured at t ≤ 5 sec.
8. Same as Note 6, except the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

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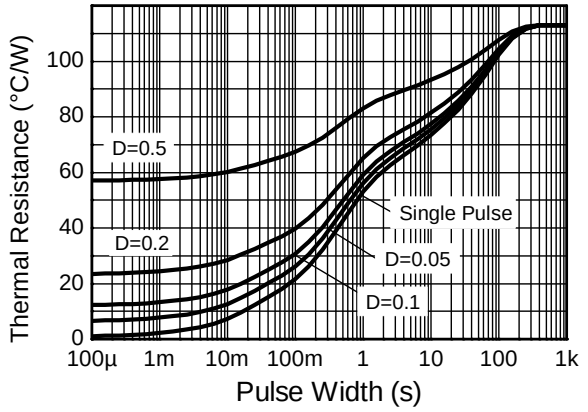
Thermal Characteristics



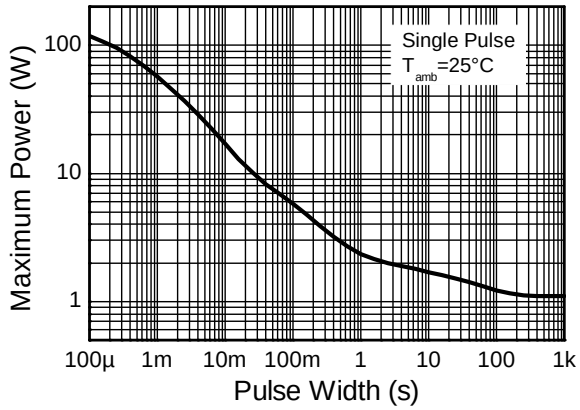
P-channel Safe Operating Area



Derating Curve



Transient Thermal Impedance



Pulse Power Dissipation

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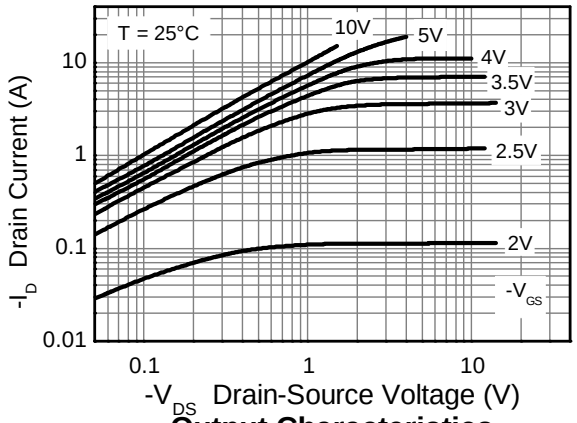
Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	-60	—	—	V	I_D = -250µA, V_{GS} = 0V
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1.0	µA	V_{DS} = -60V, 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)	$R_{DS\ (ON)}$	—	0.100	0.125	Ω	V_{GS} = -10V, I_D = -2.3A
			0.130	0.190		V_{GS} = -4.5V, I_D = -1.9A
Forward Transconductance (Notes 9 & 10)	g_{fs}	—	4.7	—	S	V_{DS} = -15V, I_D = -2.3A
Diode Forward Voltage (Note 9)	V_{SD}	—	-0.85	-0.95	V	I_S = -2.0A, V_{GS} = 0V
Reverse Recovery Time (Note 10)	t_{rr}		25.1	—	ns	I_F = -1.7A, di/dt = 100A/µs
Reverse Recovery Charge (Note 10)	Q_{rr}	—	27.2	—	nC	
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C_{iss}	—	637	—	pF	V_{DS} = -30V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}	—	70	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	53	—	pF	
Total Gate Charge (Note 11)	Q_g	—	9.8	—	nC	V_{GS} = -5.0V; V_{DS} = -30V, I_D = -2.3A
Total Gate Charge (Note 11)	Q_g	—	17.7	—	nC	V_{GS} = -10V; V_{DS} = -30V, I_D = -2.3A
Gate-Source Charge (Note 11)	Q_{gs}	—	1.6	—	nC	V_{GS} = -10V; V_{DS} = -30V, I_D = -2.3A
Gate-Drain Charge (Note 11)	Q_{gd}	—	4.4	—	nC	V_{GS} = -10V; V_{DS} = -30V, I_D = -2.3A
Turn-On Delay Time (Note 11)	$t_{D(on)}$	—	2.6	—	ns	V_{DD} = -30V, V_{GS} = -10V I_D = -1.0A, $R_G \cong$ 6.0Ω
Turn-On Rise Time (Note 11)	t_r	—	3.4	—	ns	
Turn-Off Delay Time (Note 11)	$t_{D(off)}$	—	26.2	—	ns	
Turn-Off Fall Time (Note 11)	t_f	—	11.3	—	ns	

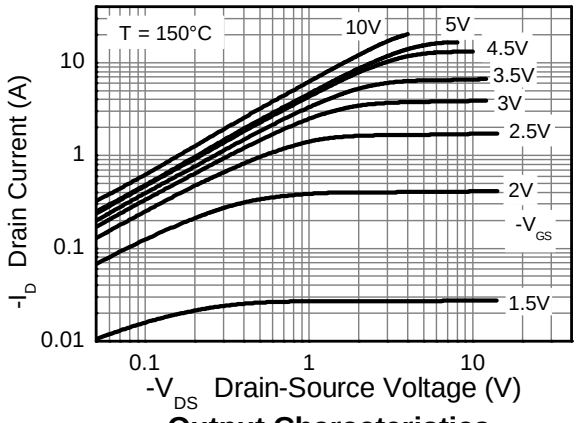
Notes:
9. Measured under pulsed conditions. Pulse width ≤ 300µs; duty cycle ≤ 2%.
10. For design aid only, not subject to production testing.
11. Switching characteristics are independent of operating junction temperatures.

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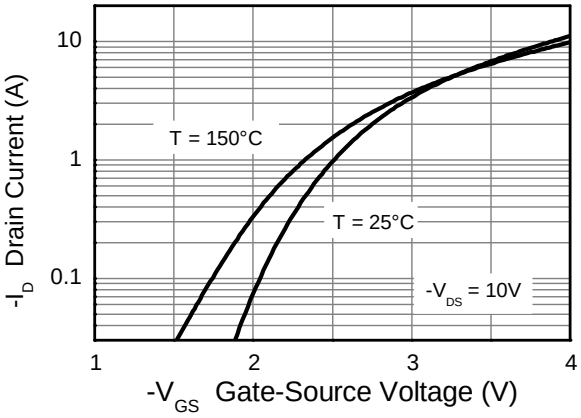
Typical Characteristics



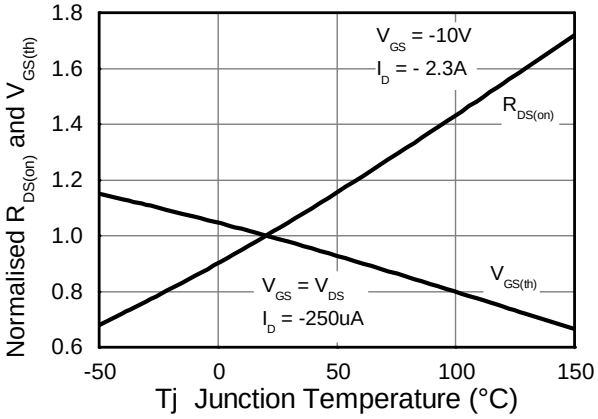
Output Characteristics



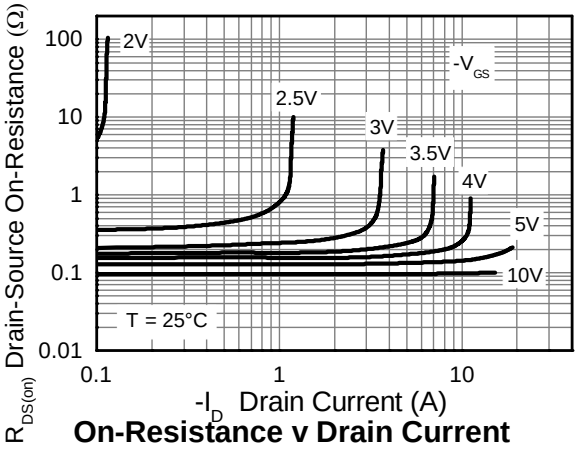
Output Characteristics



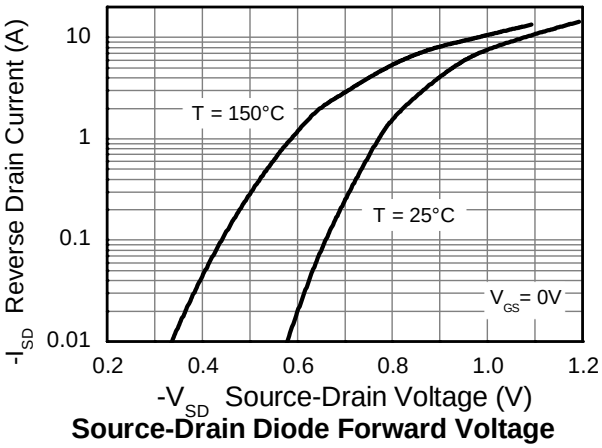
Typical Transfer Characteristics



Normalised Curves v Temperature



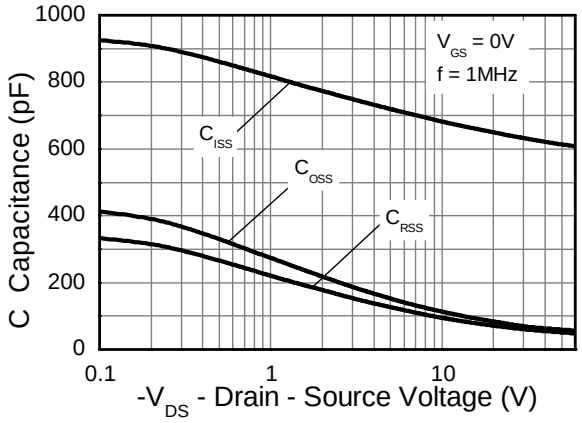
On-Resistance v Drain Current



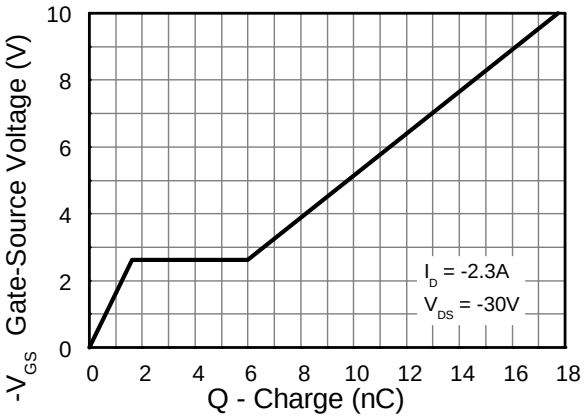
Source-Drain Diode Forward Voltage

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Typical Characteristics (cont.)

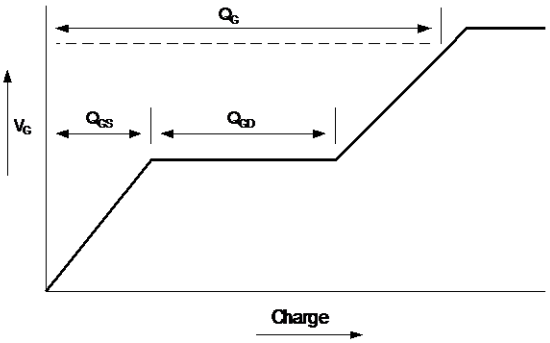


Capacitance v Drain-Source Voltage

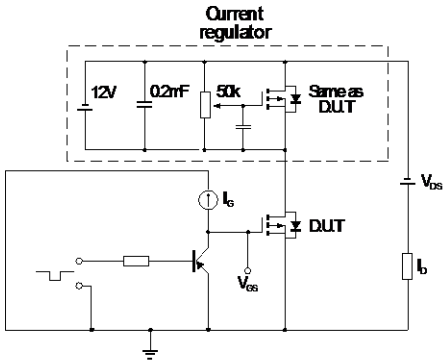


Gate-Source Voltage v Gate Charge

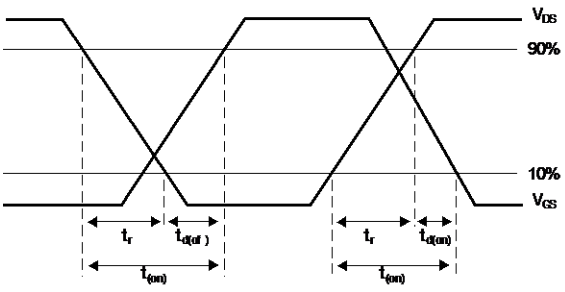
Test Circuits



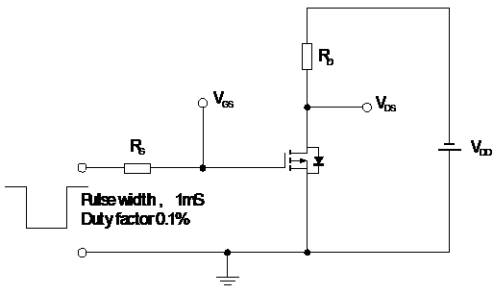
Basic gate charge waveform



Gate charge test circuit



Switching time waveforms

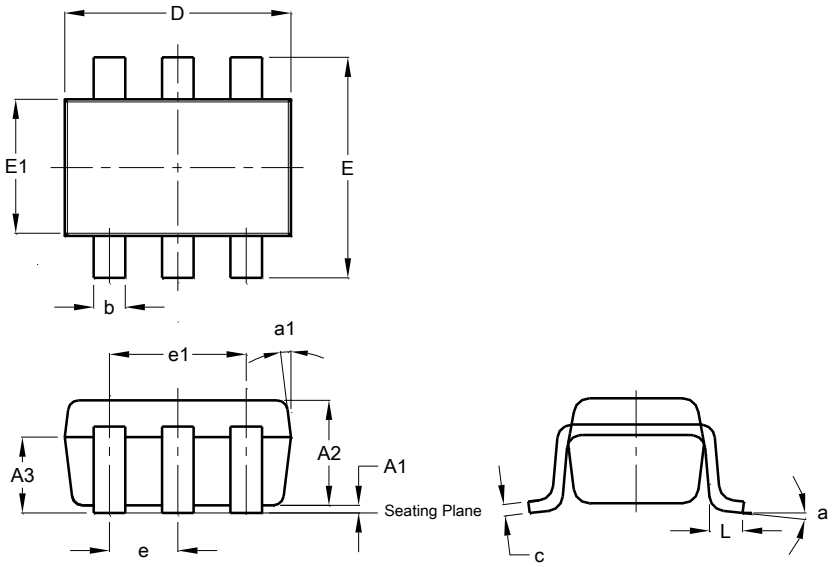


Switching time test circuit

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Package Outline Dimensions

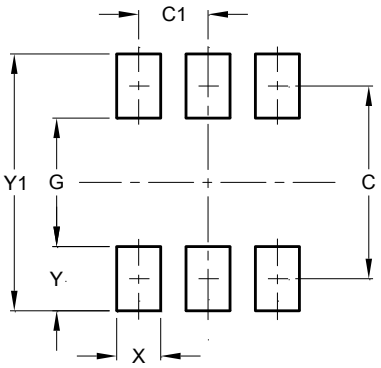
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



SOT26			
Dim	**Min**	**Max**	**Typ**
A1	0.013	0.10	0.05
A2	1.00	1.30	1.10
A3	0.70	0.80	0.75
b	0.35	0.50	0.38
c	0.10	0.20	0.15
D	2.90	3.10	3.00
e	-	-	0.95
e1	-	-	1.90
E	2.70	3.00	2.80
E1	1.50	1.70	1.60
L	0.35	0.55	0.40
a	-	-	8°
a1	-	-	7°
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)
C	2.40
C1	0.95
G	1.60
X	0.55
Y	0.80
Y1	3.20

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