

**100V COMPLEMENTARY PAIR ENHANCEMENT MODE MOSFET**
**Product Summary**

Device	$V_{(BR)DSS}$	$R_{DS(ON)} (\Omega)_{max}$	$I_D (A)_{max}$ $T_A = +25^\circ C$
Q1	100V	0.230 @ $V_{GS} = 10V$	2.1
		0.300 @ $V_{GS} = 4.5V$	1.9
Q2	-100V	0.235 @ $V_{GS} = -10V$	-2.2
		0.320 @ $V_{GS} = -4.5V$	-1.9

**Description**

This new generation complementary dual MOSFET features low on-resistance achievable with low gate drive.

**Applications**

- DC Motor Control
- Backlighting

**Features**

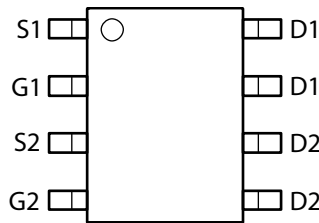
- 100V Complementary in SOIC package
- Low On-Resistance
- Fast Switching Speed
- Low Voltage ( $V_{GS} = 4.5V$ ) gate drive
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

**Mechanical Data**

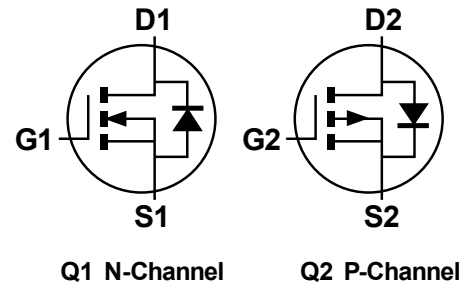
- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin annealed over Copper lead frame. Solderable per MIL-STD-202, Method 208 **(e3)**
- Weight: 0.074 grams (approximate)



Top View



Top View

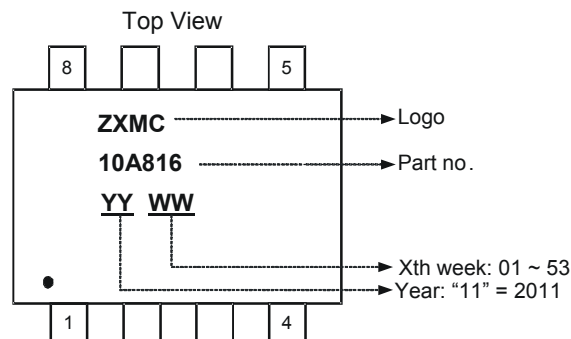


Equivalent Circuit

**Ordering Information (Note 4)**

Product	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXMC10A816N8	13	12	2,500

- 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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

**Marking Information**


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

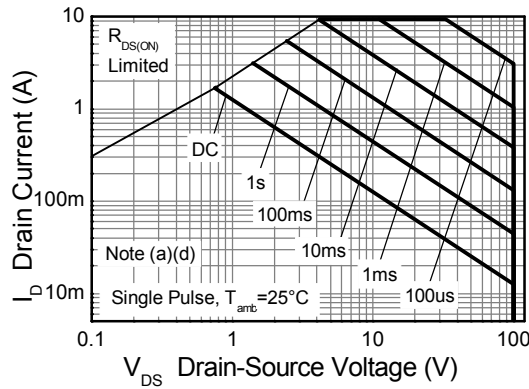
Parameter	Symbol	N-channel Q1	P-channel Q2	Unit
Drain-Source Voltage	V <sub>DSS</sub>	100	-100	V
Gate-Source Voltage	V <sub>GS</sub>	±20	±20	V
Continuous Drain Current @ V <sub>GS</sub> = 10V; T <sub>A</sub> = +25°C <sup>(b)(d)</sup> @ V <sub>GS</sub> = 10V; T <sub>A</sub> = +70°C <sup>(b)(d)</sup> @ V <sub>GS</sub> = 10V; T <sub>A</sub> = +25°C <sup>(a)(d)</sup> @ V <sub>GS</sub> = 10V; T <sub>A</sub> = +25°C <sup>(a)(e)</sup> @ V <sub>GS</sub> = 10V; T <sub>L</sub> = +25°C <sup>(f)(d)</sup>	I <sub>D</sub>	2.1 1.7 1.7 2.0 2.3	-2.2 -1.8 -1.7 -2.0 -2.4	A
Pulsed Drain Current @ V <sub>GS</sub> = 10V; T <sub>A</sub> = +25°C <sup>(c)(d)</sup>	I <sub>DM</sub>	9.4	-10.5	A
Continuous Source Current (Body Diode) at T <sub>A</sub> = +25°C <sup>(b)(d)</sup>	I <sub>S</sub>	3.0	-3.1	A
Pulsed Source Current (Body Diode) at T <sub>A</sub> = +25°C <sup>(c)(d)</sup>	I <sub>SM</sub>	9.4	-10.5	A
Avalanche Current (g) L = 0.1 mH	I <sub>AS</sub>	1.2	12	A
Power Dissipation at T <sub>A</sub> = +25°C <sup>(a)(d)</sup> Linear Derating Factor	P <sub>D</sub>	1.3 10.0		W mW/°C
Power Dissipation at T <sub>A</sub> = +25°C <sup>(a)(e)</sup> Linear Derating Factor	P <sub>D</sub>	1.8 14.2		W mW/°C
Power Dissipation at T <sub>A</sub> = +25°C <sup>(b)(d)</sup> Linear Derating Factor	P <sub>D</sub>	2.1 16.7		W mW/°C
Power Dissipation at T <sub>L</sub> = +25°C <sup>(f)(d)</sup> Linear Derating Factor	P <sub>D</sub>	2.4 18.9	2.6 20.4	W mW/°C
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55 to +150		°C

**Thermal Characteristics**

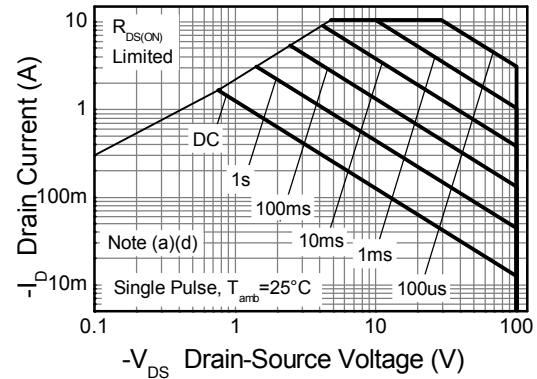
Parameter	Symbol	Value		Unit
Junction to Ambient <sup>(a)(d)</sup>	R <sub>θJA</sub>	100		°C/W
Junction to Ambient <sup>(a)(e)</sup>	R <sub>θJA</sub>	70		°C/W
Junction to Ambient <sup>(b)(d)</sup>	R <sub>θJA</sub>	60		°C/W
Junction to Lead <sup>(f)(d)</sup>	R <sub>θJL</sub>	53	49	°C/W

- Notes:
- (a) 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.
  - (b) Same as note (a), except the device is measured at t ≤ 10 sec.
  - (c) Same as note (a), except the device is pulsed with D= 0.02 and pulse width 300μs. The pulse current is limited by the maximum junction temperature.
  - (d) For a dual device with one active die.
  - (e) For a device with two active die running at equal power.
  - (f) Thermal resistance from junction to solder-point (at the end of the drain lead); the device is operating in a steady-state condition.
  - (g) IAS rating are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C.

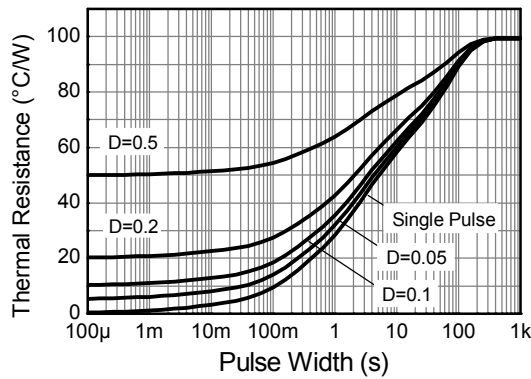
## Thermal Characteristics



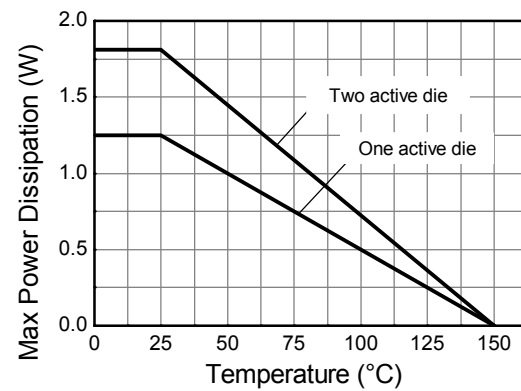
**N-channel Safe Operating Area**



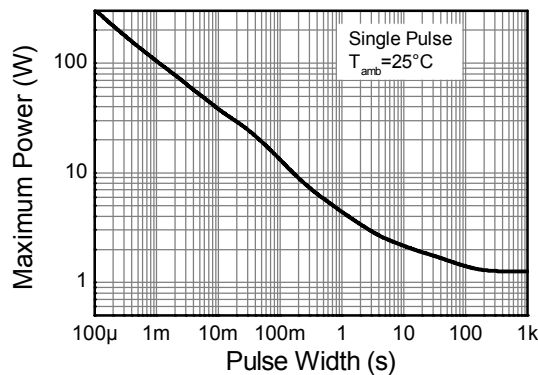
**P-channel Safe Operating Area**



**Transient Thermal Impedance**



**Derating Curve**



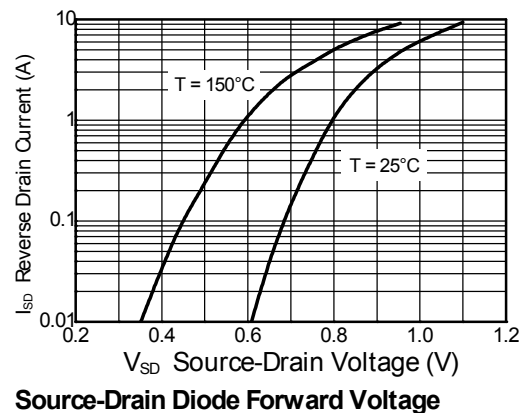
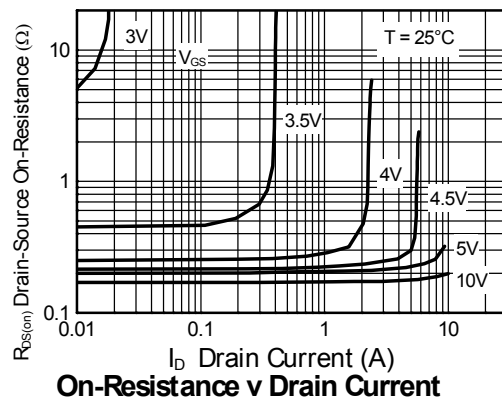
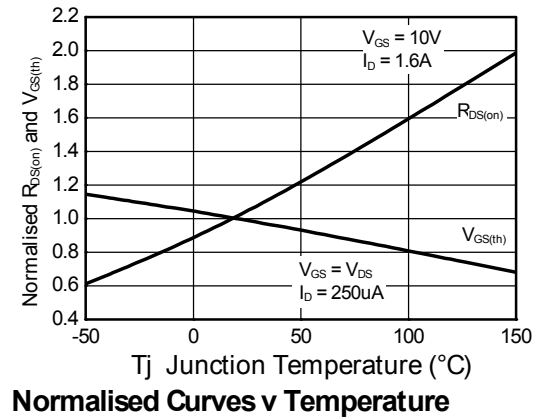
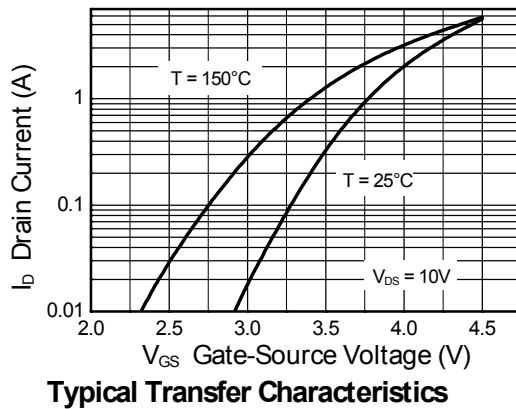
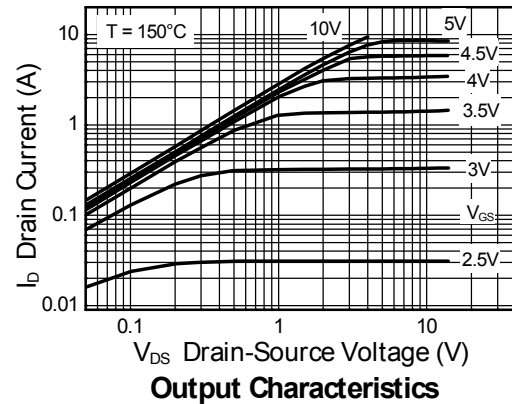
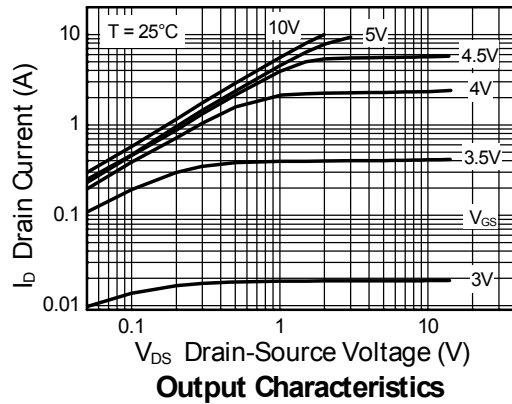
**Pulse Power Dissipation**

**Electrical Characteristics Q1 N-Channel** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

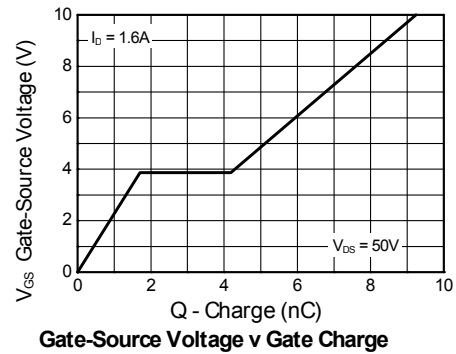
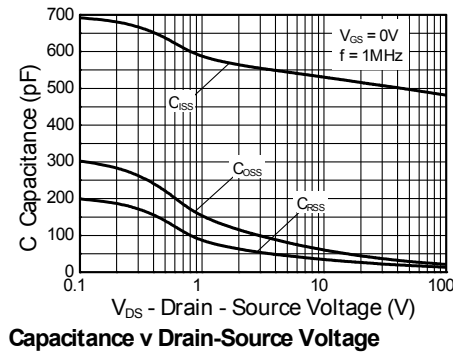
Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Static						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	100	—	—	V	I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	0.5	μA	V <sub>DS</sub> = 100V, V <sub>GS</sub> = 0V
Gate-Body Leakage	I <sub>GSS</sub>	—	—	100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	1.7	—	2.4	V	I <sub>D</sub> = 250μA, V <sub>DS</sub> = V <sub>GS</sub>
Static Drain-Source On-State Resistance <sup>(a)</sup>	R <sub>DS(ON)</sub>	—	0.170 0.210	0.230 0.300	Ω	V <sub>GS</sub> = 10V, I <sub>D</sub> = 1.0A V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 0.5A
Forward Transconductance <sup>(a) (c)</sup>	g <sub>fs</sub>	—	4.8	—	S	V <sub>DS</sub> = 15V, I <sub>D</sub> = 1.6A
Dynamic Capacitance <sup>(c)</sup>						
Input Capacitance	C <sub>iSS</sub>	—	497	—	pF	V <sub>DS</sub> = 50V, V <sub>GS</sub> = 0V f = 1MHz
Output Capacitance	C <sub>oSS</sub>	—	29	—	pF	
Reverse Transfer Capacitance	C <sub>rSS</sub>	—	18	—	pF	
Switching <sup>(b) (c)</sup>						
Turn-On-Delay Time	t <sub>d(ON)</sub>	—	2.9	—	ns	V <sub>DD</sub> = 50V, V <sub>GS</sub> = 10V I <sub>D</sub> = 1.0A R <sub>G</sub> ≅ 6.0Ω,
Rise Time	t <sub>r</sub>	—	2.1	—	ns	
Turn-Off Delay Time	t <sub>d(OFF)</sub>	—	12.1	—	ns	
Fall Time	t <sub>f</sub>	—	5.0	—	ns	
Gate Charge <sup>(c)</sup>						
Total Gate Charge	Q <sub>g</sub>	—	9.2	—	nC	V <sub>DS</sub> = 50V, V <sub>GS</sub> = 10V I <sub>D</sub> = 1.6A
Gate-Source Charge	Q <sub>gs</sub>	—	1.7	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	2.5	—	nC	
Source–Drain Diode						
Diode Forward Voltage <sup>(a)</sup>	V <sub>SD</sub>	—	0.85	0.95	V	I <sub>S</sub> = 1.7A, V <sub>GS</sub> = 0V
Reverse Recovery Time <sup>(c)</sup>	t <sub>rr</sub>	—	32	—	ns	I <sub>S</sub> = 1.7A, di/dt = 100A/μs
Reverse Recovery Charge <sup>(c)</sup>	Q <sub>rr</sub>	—	40	—	nC	
Gate Resistance						
Gate Resistance	R <sub>G</sub>	0	—	3	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz

Notes: (a) Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%.  
(b) Switching characteristics are independent of operating junction temperature.  
(c) For design aid only, not subject to production testing.

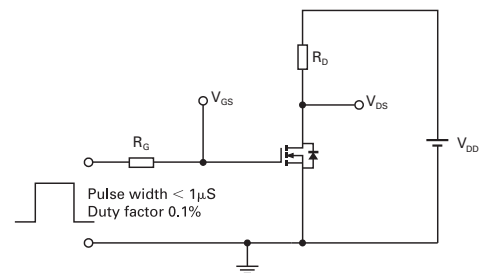
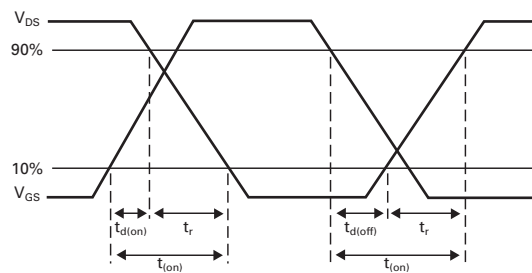
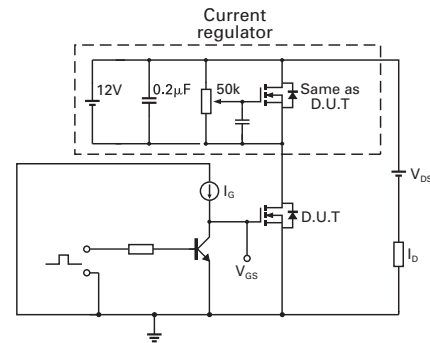
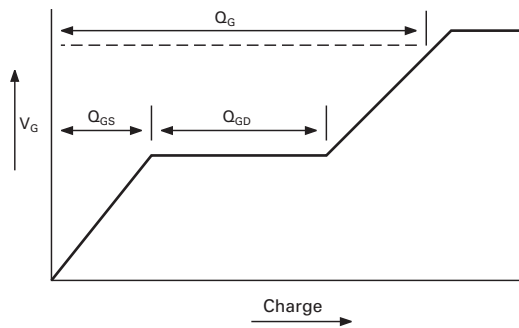
## Typical Characteristics Q1 N-Channel



## Typical Characteristics Q1 N-Channel (cont.)



## Test Circuits

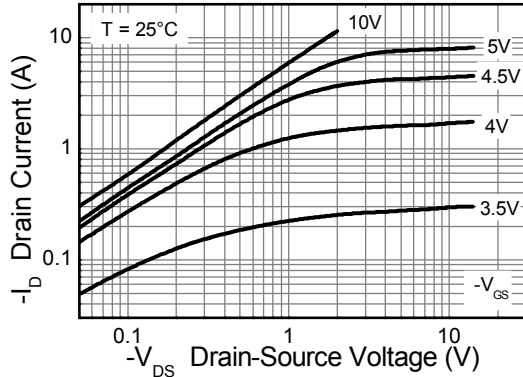


**Electrical Characteristics Q2 P-Channel** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

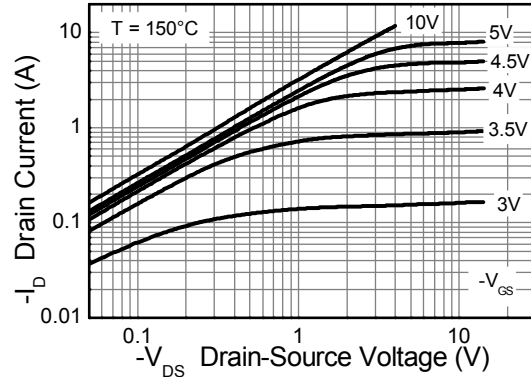
Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Static						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	-100	—	—	V	I <sub>D</sub> = -250μA, V <sub>GS</sub> = 0V
Zero Gate Voltage Drain current	I <sub>DSS</sub>	—	—	-0.5	μA	V <sub>DS</sub> = -100V, V <sub>GS</sub> = 0V
Gate-Body Leakage	I <sub>GSS</sub>	—	—	100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	-2.0	—	-3.0	V	I <sub>D</sub> = -250μA, V <sub>DS</sub> = V <sub>GS</sub>
Static Drain-Source On-State Resistance <sup>(a)</sup>	R <sub>DS(ON)</sub>	—	0.170 0.250	0.235 0.320	Ω	V <sub>GS</sub> = -10V, I <sub>D</sub> = -1.0A V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -0.5A
Forward Transconductance <sup>(a) (c)</sup>	g <sub>fs</sub>	—	4.7	—	S	V <sub>DS</sub> = -15V, I <sub>D</sub> = -2.1A
Dynamic Capacitance <sup>(c)</sup>						
Input Capacitance	C <sub>iss</sub>	—	717	—	pF	V <sub>DS</sub> = -50V, V <sub>GS</sub> = 0V f = 1MHz
Output Capacitance	C <sub>oss</sub>	—	55	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	46	—	pF	
Switching <sup>(b) (c)</sup>						
Turn-On-Delay Time	t <sub>d(ON)</sub>	—	4.3	—	ns	V <sub>DD</sub> = -50V, V <sub>GS</sub> = -10V I <sub>D</sub> = -1A R <sub>G</sub> ≅ 6.0Ω,
Rise Time	t <sub>r</sub>	—	5.2	—	ns	
Turn-Off Delay Time	t <sub>d(OFF)</sub>	—	20	—	ns	
Fall Time	t <sub>f</sub>	—	12	—	ns	
Gate Charge <sup>(c)</sup>						
Total Gate Charge	Q <sub>g</sub>	—	16.5	—	nC	V <sub>DS</sub> = -50V, V <sub>GS</sub> = -10V I <sub>D</sub> = -2.1A
Gate-Source Charge	Q <sub>gs</sub>	—	2.5	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	5.4	—	nC	
Source-Drain Diode						
Diode Forward Voltage <sup>(a)</sup>	V <sub>SD</sub>	—	-0.85	-0.95	V	I <sub>S</sub> = -1.7A, V <sub>GS</sub> = 0V
Reverse Recovery Time <sup>(c)</sup>	t <sub>rr</sub>	—	43	—	ns	I <sub>S</sub> = -1.7A, di/dt = 100A/μs
Reverse Recovery Charge <sup>(c)</sup>	Q <sub>rr</sub>	—	77	—	nC	
Gate Resistance						
Gate Resistance	R <sub>G</sub>	0	—	100	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz

Notes: (a) Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%.  
(b) Switching characteristics are independent of operating junction temperature.  
(c) For design aid only, not subject to production testing.

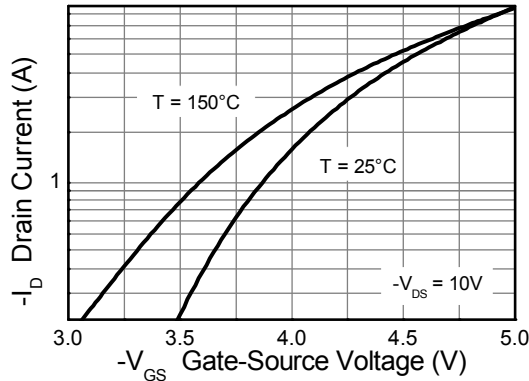
## Typical Characteristics Q2 P-Channel



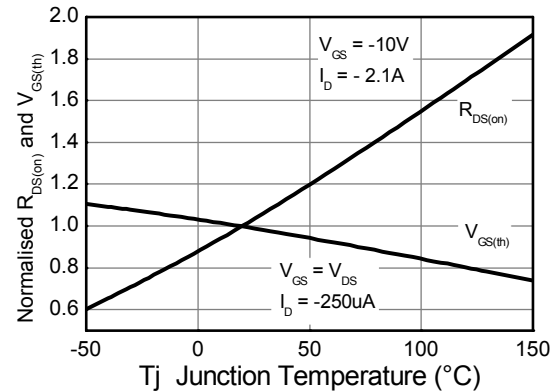
**Output Characteristics**



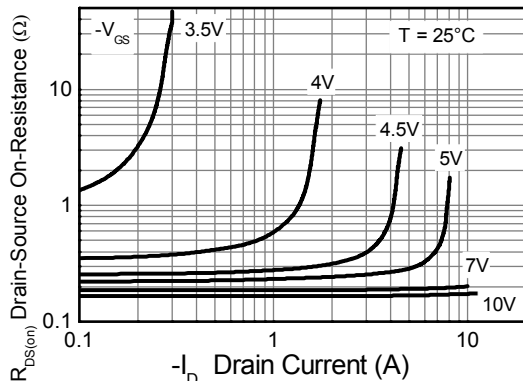
**Output Characteristics**



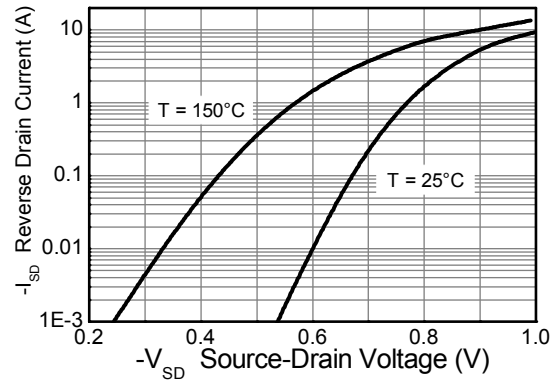
**Typical Transfer Characteristics**



**Normalised Curves v Temperature**



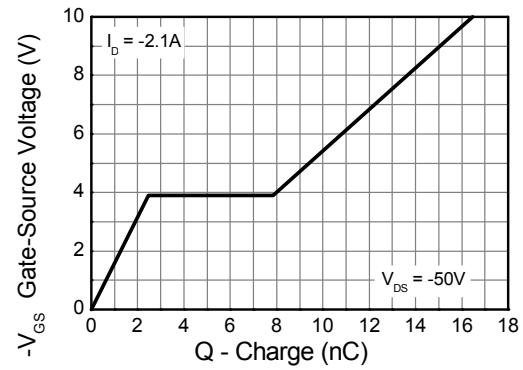
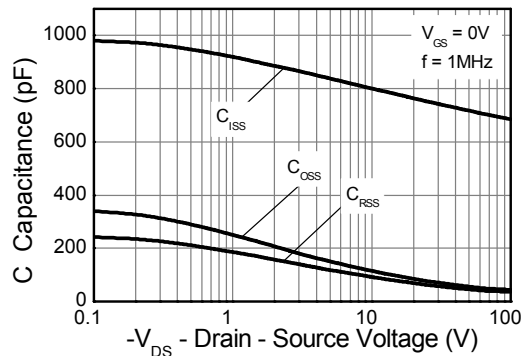
**On-Resistance v Drain Current**



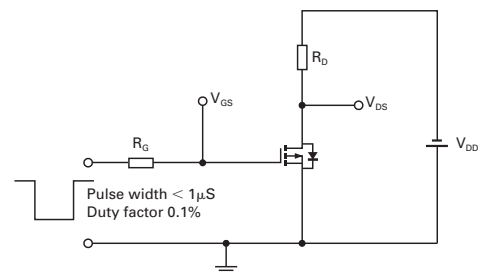
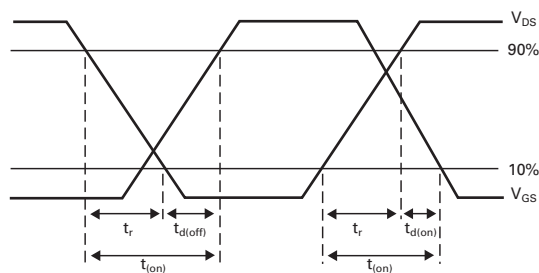
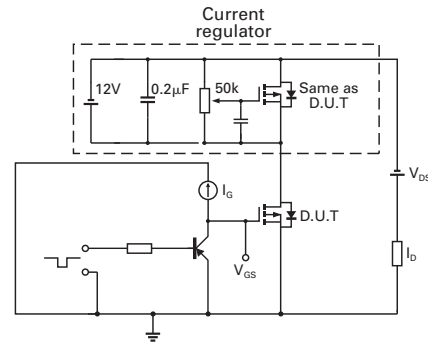
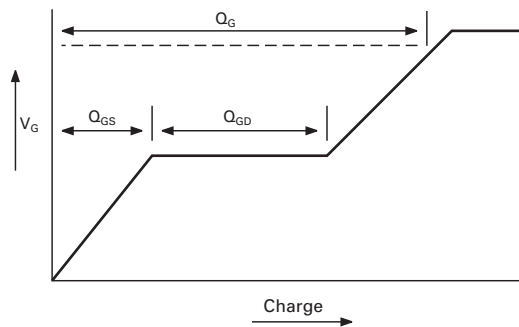
**Source-Drain Diode Forward Voltage**



## Typical Characteristics Q2 P-Channel (cont.)

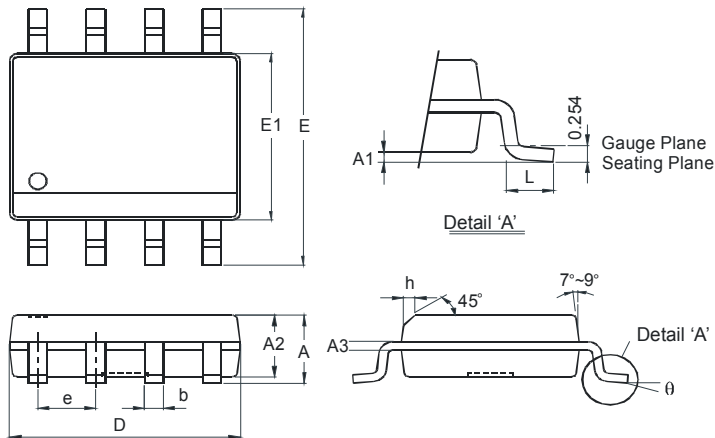


## Test Circuits



## Package Outline Dimensions

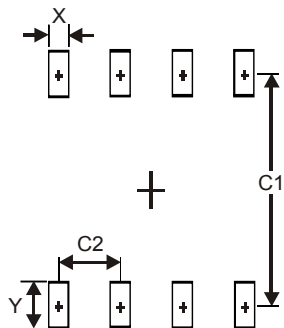
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



SO-8		
Dim	Min	Max
A	-	1.75
A1	0.10	0.20
A2	1.30	1.50
A3	0.15	0.25
b	0.3	0.5
D	4.85	4.95
E	5.90	6.10
E1	3.85	3.95
e	1.27 Typ	
h	-	0.35
L	0.62	0.82
θ	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)
X	0.60
Y	1.55
C1	5.4
C2	1.27

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