

**COMPLEMENTARY 30V ENHANCEMENT MODE MOSFET H-BRIDGE**
**Product Summary**

Device	BV <sub>DSS</sub>	R <sub>DS(ON)</sub> max	I <sub>D</sub> max T <sub>A</sub> = +25°C
N-Channel	30V	0.12Ω @ V <sub>GS</sub> = 10V	3.1A
P-Channel	-30V	0.21Ω @ V <sub>GS</sub> = -10V	-2.3A

**Description**

This new generation of trench MOSFETs from Zetex utilizes a unique structure that combines the benefits of low on-resistance with fast switching speed. This makes them ideal for high efficiency, low voltage, power management applications.

**Applications**

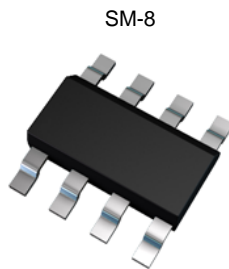
- Single Phase DC Fan Motor Drive

**Features**

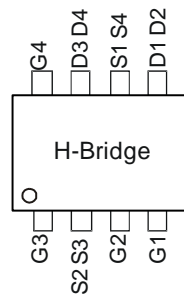
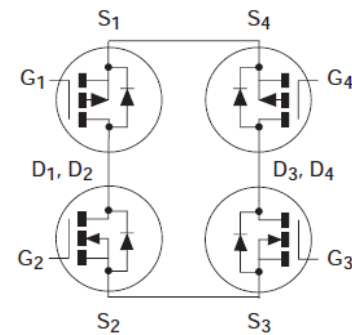
- Low On-Resistance
- Fast Switching Speed
- Low Threshold
- Low Gate Drive
- Single SM-8 Surface Mount Package
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

**Mechanical Data**

- Case: SM-8 (8 LEAD SOT223)
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See Diagram
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe; Solderable per MIL-STD-202, Method 208(Ⓢ)
- Weight: 0.117 grams (Approximate)



Top View

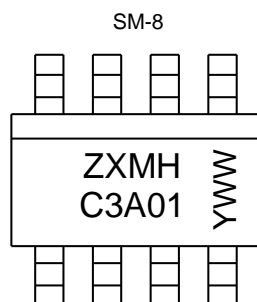

 Top View  
Pin Configuration


Internal Schematic

**Ordering Information** (Note 4)

Part Number	REEL SIZE	TAPE WIDTH	QUANTITY PER REEL
ZXMHC3A01T8TA	7"	12mm	1,000 units

- Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
  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**


ZXMHC3A01 = Product Type Marking Code  
 YWW = Date Code Marking  
 Y or  $\bar{Y}$  = Last Digit of Year (ex: 5= 2015)  
 WW or  $\bar{W}W$  = Week Code (01~53)

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

Characteristic			Symbol	N-channel	P-channel	Units
Drain-Source Voltage			$V_{DSS}$	30	-30	V
Gate-Source Voltage			$V_{GSS}$	$\pm 20$	$\pm 20$	V
Continuous Drain Current, $V_{GS} = 10\text{V}$ (Note 8)	Steady State	$T_A = +25^\circ\text{C}$ (Note 6 & 8)	$I_D$	3.1	-2.3	A
		$T_A = +70^\circ\text{C}$ (Note 6 & 8)		2.5	-1.8	
		$T_A = +25^\circ\text{C}$ (Note 5 & 8)		2.7	-2.0	
Continuous Source Current (body diode) (Note 6)			$I_S$	2.3	-2.2	A
Pulsed Drain Current (Note 7)			$I_{DM}$	14.3	-10.8	A
Pulsed Source Current (Note 7)			$I_{SM}$	14.5	-10.8	A

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

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 8)	$T_A = +25^\circ\text{C}$ (Note 5)	$P_D$	1.3	W
Linear Derating Factor			10.4	mW/ $^\circ\text{C}$
Total Power Dissipation (Note 8)	$T_A = +25^\circ\text{C}$ (Note 6)	$P_D$	1.7	W
Linear Derating Factor			13.6	mW/ $^\circ\text{C}$
Thermal Resistance, Junction to Ambient (Note 8)	Steady State (Note 5)	$R_{\theta JA}$	96	$^\circ\text{C}/\text{W}$
	Steady State (Note 6)		73	$^\circ\text{C}/\text{W}$
Operating and Storage Temperature Range		$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

- Notes:
5. For a device surface mounted on 50mm x 50mm x 1.6mm FR4 PCB with high coverage of single sided 2oz copper, in still air conditions..
  6. For a device surface mounted on FR4 PCB measured at  $t \leq 10$  seconds.
  7. Repetitive rating 50mm x 50mm x 1.6mm FR4 PCB,  $D = 0.02$ , pulse width 300 $\mu\text{s}$  - pulse width limited by maximum junction temperature. Refer to transient thermal Impedance graph.
  8. For device with one active die.

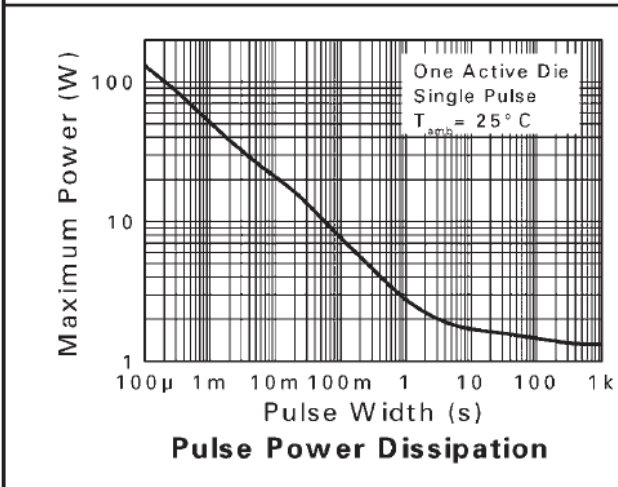
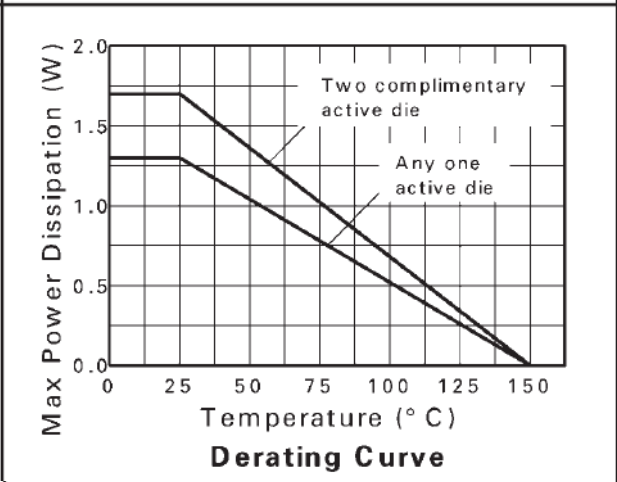
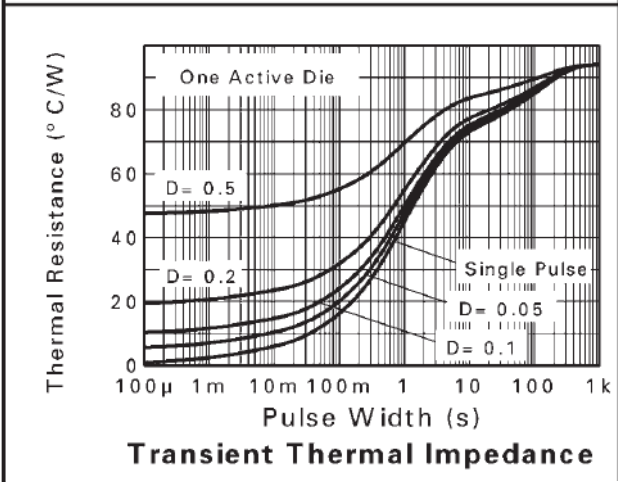
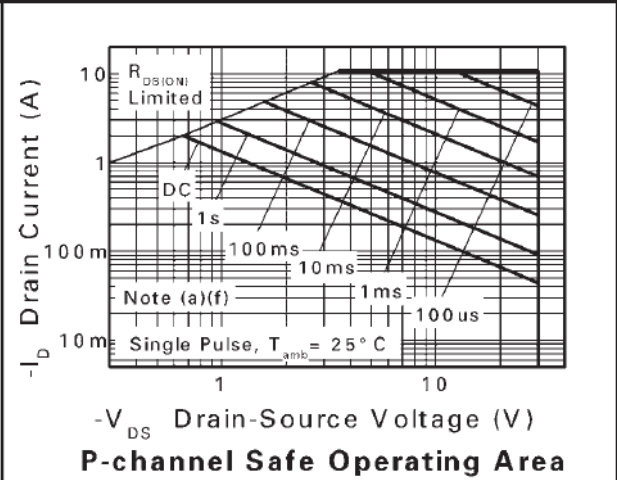
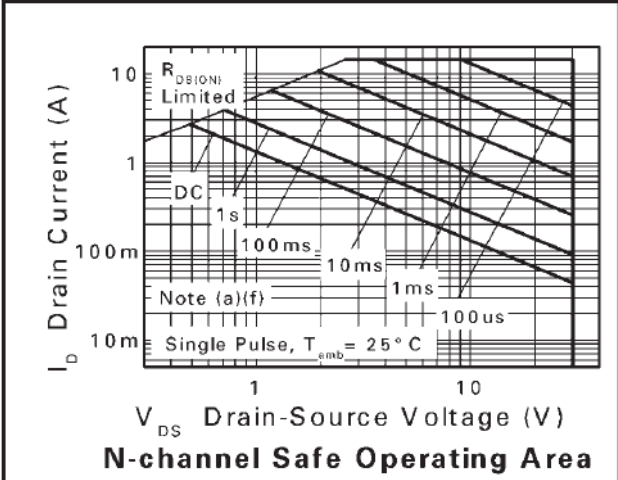
**Electrical Characteristics N-CHANNEL** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	30	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1.0	μA	V <sub>DS</sub> = 30V, 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	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance (Note 9)	R <sub>DS(ON)</sub>	—	—	0.12	Ω	V <sub>GS</sub> = 10V, I <sub>D</sub> = 2.5A
		—	—	0.18		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 2.0A
Forward Transfer Admittance (Notes 9 & 11)	g <sub>fs</sub>	—	3.5	—	S	V <sub>DS</sub> = 4.5V, I <sub>D</sub> = 2.5A
Diode Forward Voltage (Note 9)	V <sub>SD</sub>	—	—	0.95	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1.7A
<b>DYNAMIC CHARACTERISTICS (Note 11)</b>						
Input Capacitance	C <sub>iss</sub>	—	190	—	pF	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1MHz
Output Capacitance	C <sub>oss</sub>	—	38	—		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	20	—		
Total Gate Charge (Note 10)	Q <sub>g</sub>	—	3.9	—	nC	V <sub>DS</sub> = 15V, I <sub>D</sub> = 2.5A, V <sub>GS</sub> = 10V
Gate-Source Charge (Note 10)	Q <sub>gs</sub>	—	0.6	—		
Gate-Drain Charge (Note 10)	Q <sub>gd</sub>	—	0.9	—		
Turn-On Delay Time (Note 10)	t <sub>D(on)</sub>	—	1.7	—	ns	V <sub>DD</sub> = 15V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 2.5A, R <sub>G</sub> ≅ 6.0Ω,
Turn-On Rise Time (Note 10)	t <sub>r</sub>	—	2.3	—		
Turn-Off Delay Time (Note 10)	t <sub>D(off)</sub>	—	6.6	—		
Turn-Off Fall Time	t <sub>f</sub>	—	2.9	—		
Reverse Recovery Time	t <sub>rr</sub>	—	17.7	—	ns	I <sub>S</sub> = 1.8A, di/dt = 100A/μs
Reverse Recovery Charge	Q <sub>rr</sub>	—	13	—	nC	

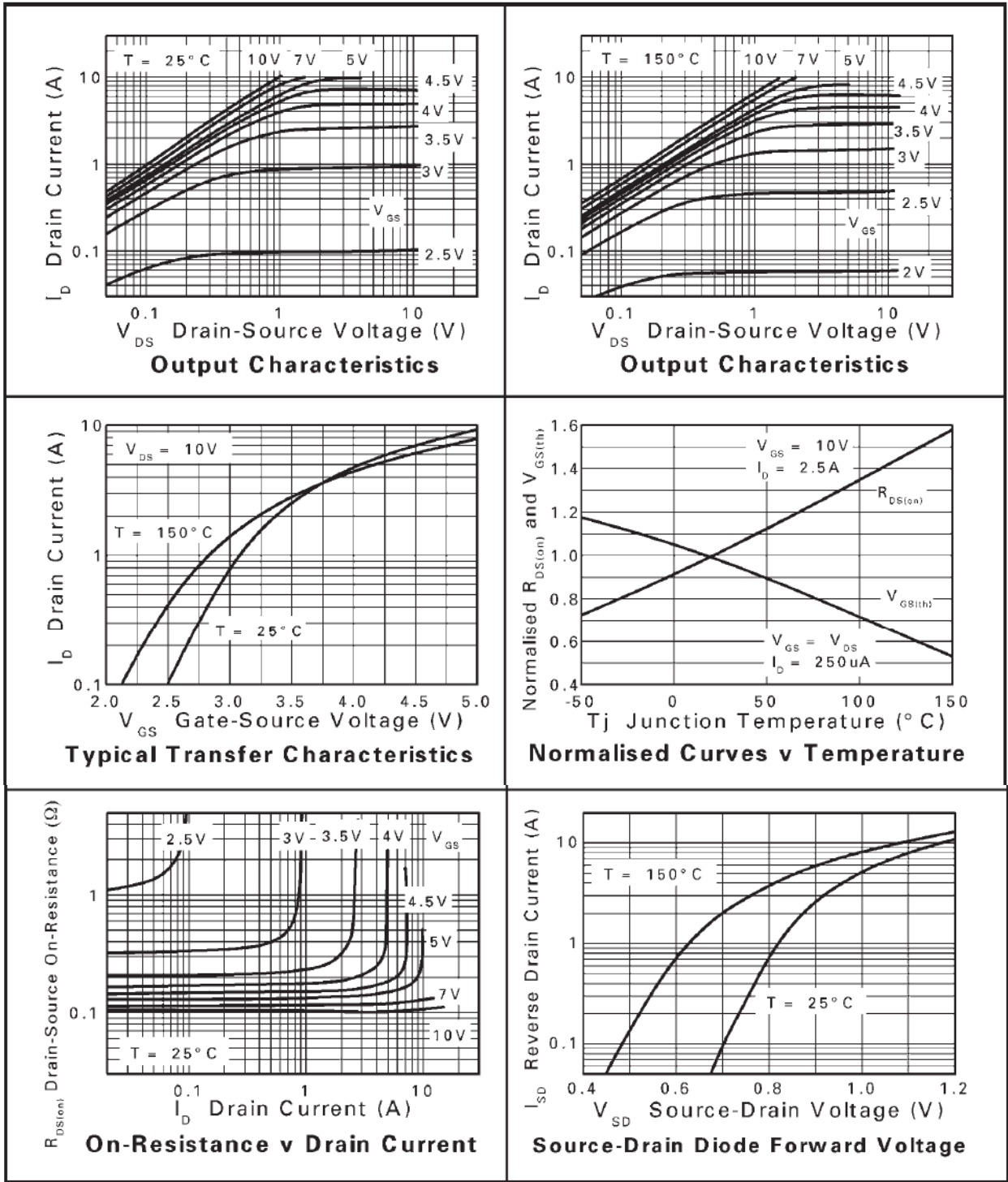
**Electrical Characteristics P-CHANNEL** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-30	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	-1.0	μA	V <sub>DS</sub> = -30V, 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	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA
Static Drain-Source On-Resistance (Note 9)	R <sub>DS(ON)</sub>	—	—	0.21	Ω	V <sub>GS</sub> = -10V, I <sub>D</sub> = -1.4A
		—	—	0.33		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -1.1A
Forward Transfer Admittance (Notes 9 & 11)	g <sub>fs</sub>	—	2.5	—	S	V <sub>DS</sub> = -15V, I <sub>D</sub> = -1.4A
Diode Forward Voltage (Note 9)	V <sub>SD</sub>	—	-0.85	-0.95	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -1.1A
<b>DYNAMIC CHARACTERISTICS (Note 11)</b>						
Input Capacitance	C <sub>iss</sub>	—	204	—	pF	V <sub>DS</sub> = -15V, V <sub>GS</sub> = 0V, f = 1MHz
Output Capacitance	C <sub>oss</sub>	—	39.8	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	25.8	—	pF	
Gate Charge (V <sub>GS</sub> = -5.0V) (Note 10)	Q <sub>g</sub>	—	2.6	—	nC	V <sub>DS</sub> = -15V, I <sub>D</sub> = -1.4A,
Total Gate Charge (V <sub>GS</sub> = -10V) (Note 10)	Q <sub>g</sub>	—	5.2	—	nC	
Gate-Source Charge (Note 10)	Q <sub>gs</sub>	—	0.7	—	nC	
Gate-Drain Charge (Note 10)	Q <sub>gd</sub>	—	0.9	—	nC	V <sub>DD</sub> = -15V, V <sub>GS</sub> = -10V, R <sub>G</sub> ≅ 6.0Ω, I <sub>D</sub> = -1.0A
Turn-On Delay Time (Note 10)	t <sub>D(on)</sub>	—	1.2	—	ns	
Turn-On Rise Time (Note 10)	t <sub>r</sub>	—	2.3	—	ns	
Turn-Off Delay Time (Note 10)	t <sub>D(off)</sub>	—	12.1	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	7.5	—	ns	I <sub>S</sub> = -0.95A, di/dt = 100A/μs
Reverse Recovery Time	t <sub>rr</sub>	—	19	—	ns	
Reverse Recovery Charge	Q <sub>rr</sub>	—	15	—	nC	

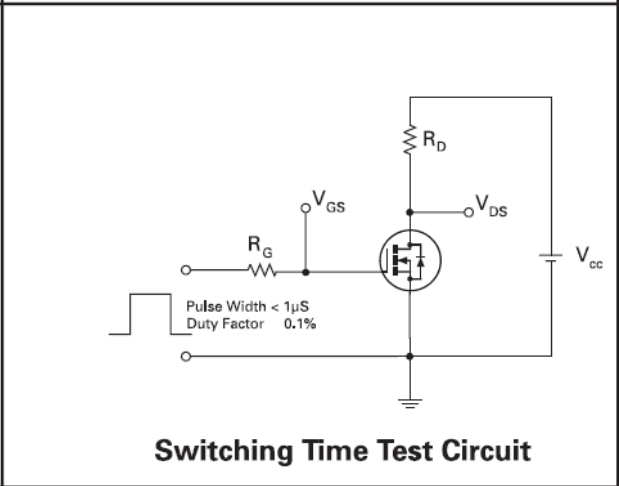
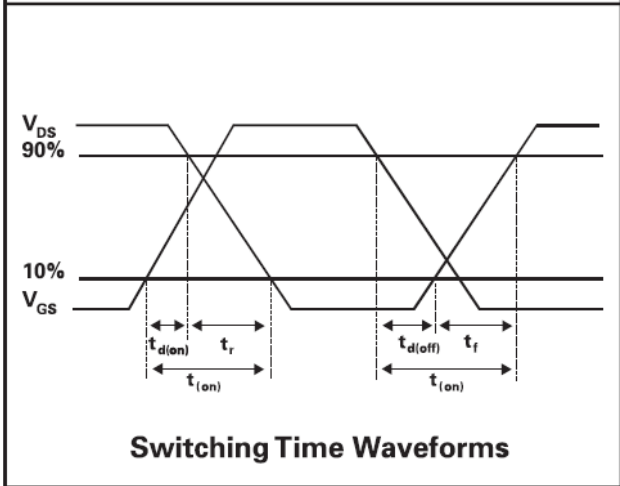
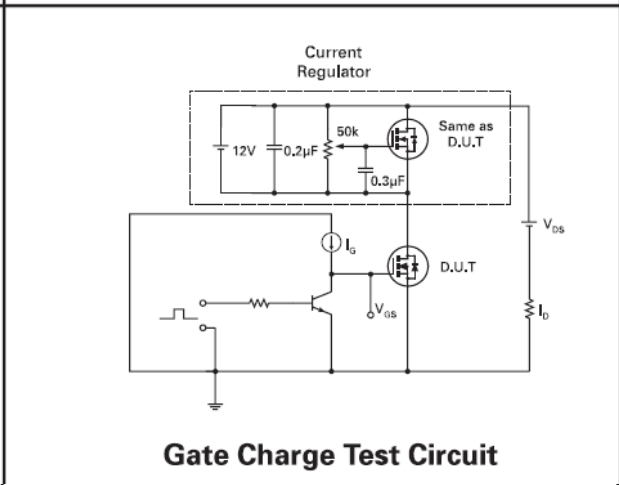
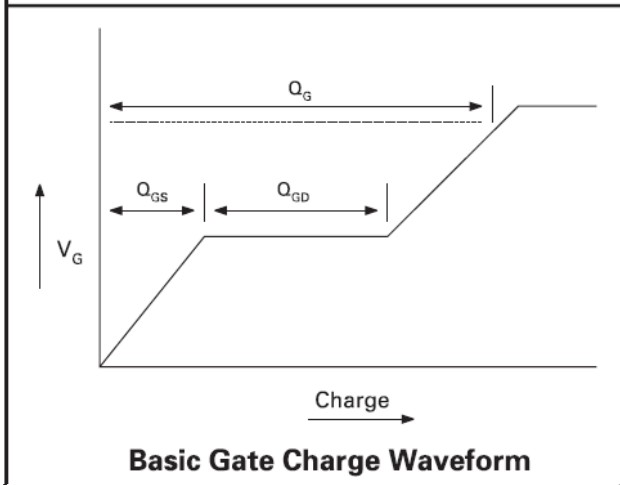
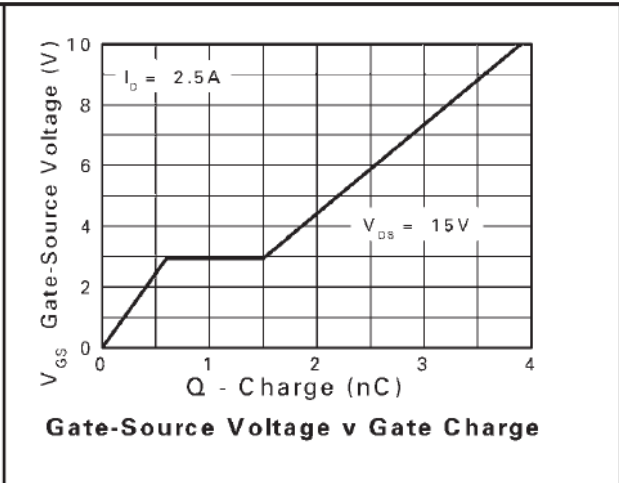
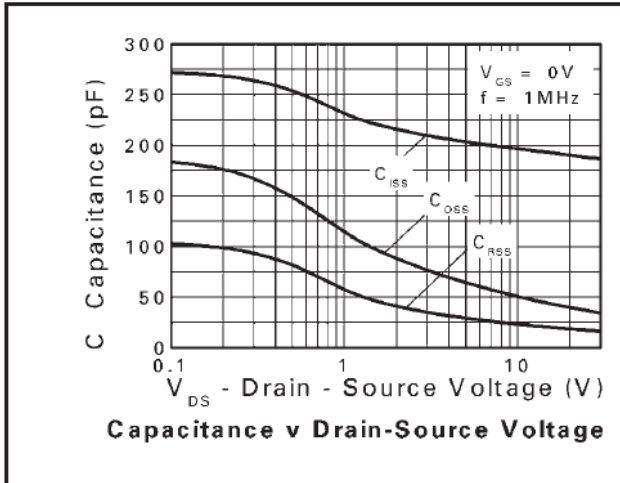
- Notes: 9. Measured under pulsed conditions. Width ≤ 300μs. Duty cycle ≤ 2%.  
 10. Switching characteristics are independent of operating junction temperature.  
 11. For design aid only, not subject to production testing.



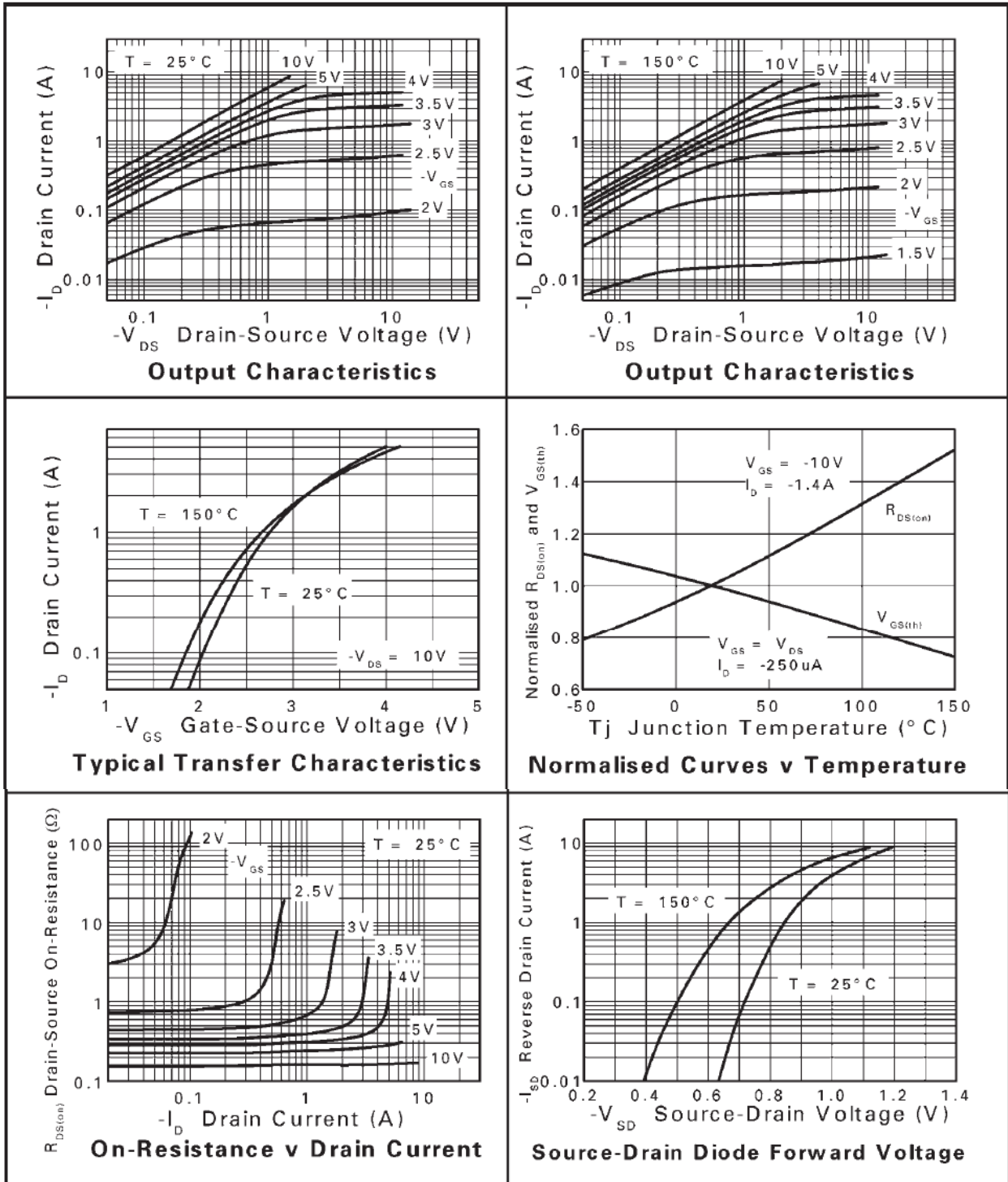
**Typical Characteristics N-CHANNEL**



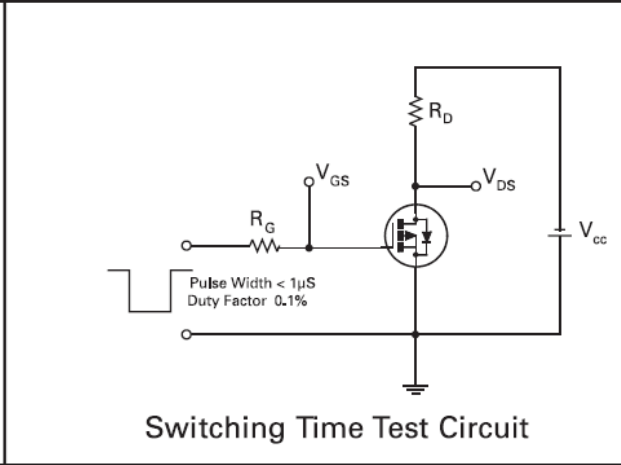
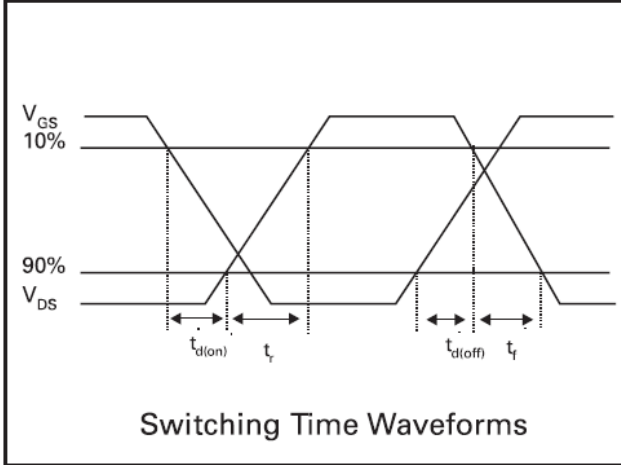
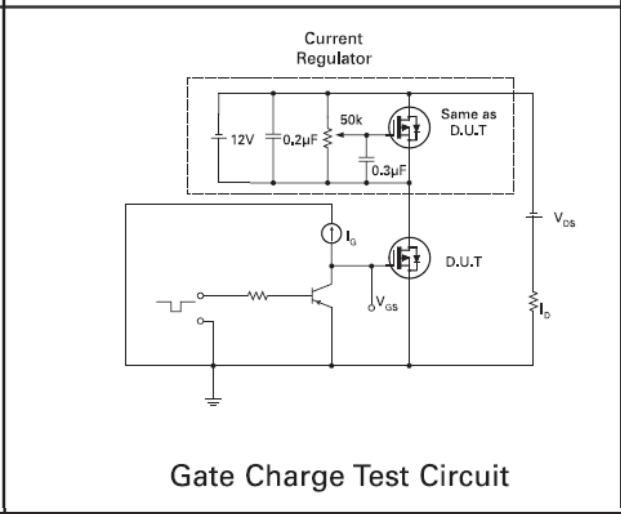
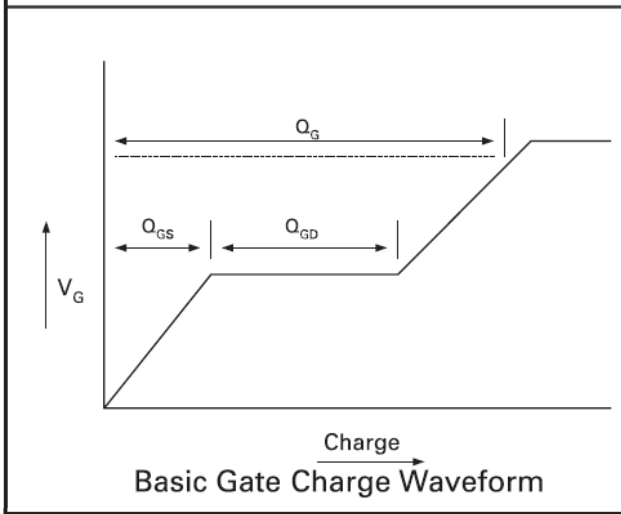
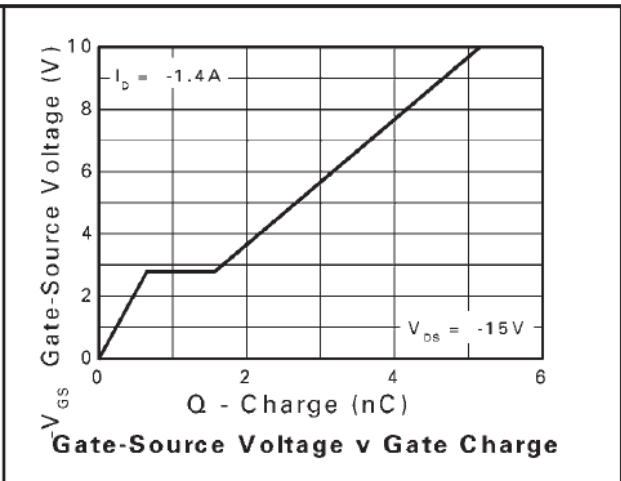
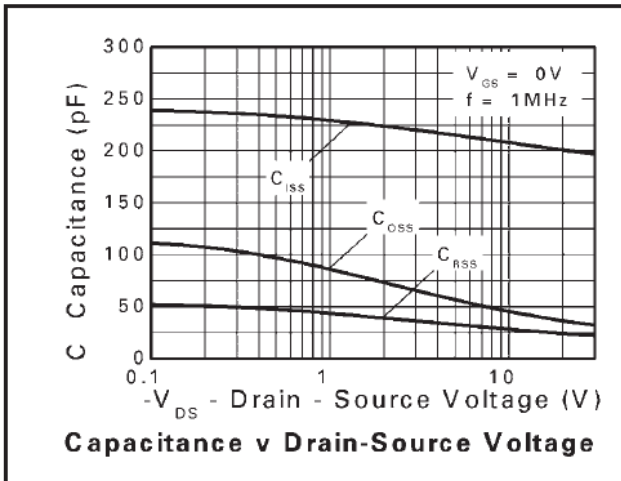
**Typical Characteristics N-CHANNEL**



**Typical Characteristics P-CHANNEL**



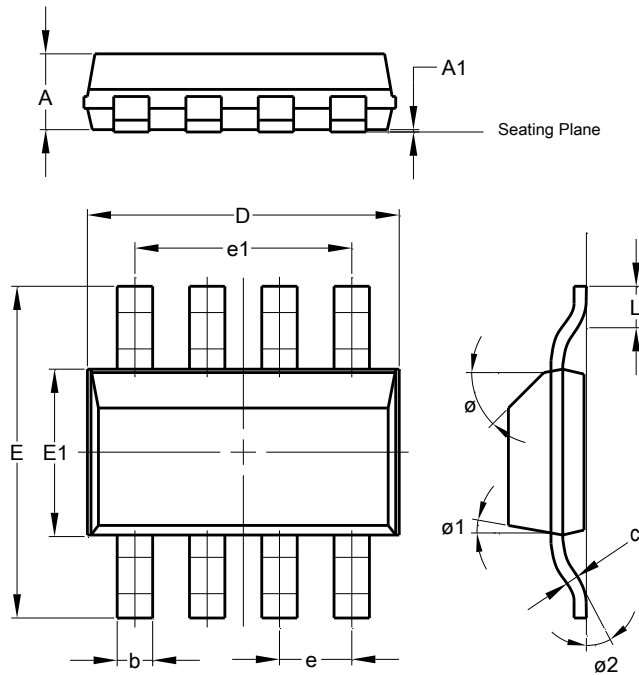
**Typical Characteristics P-CHANNEL**





**Package Outline Dimensions**

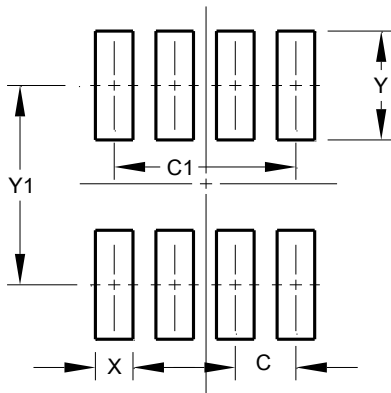
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



SM-8			
Dim	Min	Max	Typ
A	--	1.70	1.60
A1	0.02	0.10	0.04
b	0.70	0.90	0.80
c	0.24	0.32	0.28
D	6.30	6.70	6.60
e	1.53 REF		
e1	4.59 REF		
E	6.70	7.30	7.00
E1	3.30	3.70	3.50
L	0.75	1.00	0.90
Ø	--	--	45°
Ø1	--	15°	--
Ø2	--	--	10°
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	1.52
C1	4.60
X	0.95
Y	2.80
Y1	6.80

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