

COMPLEMENTARY 60V ENHANCEMENT MODE MOSFET H-BRIDGE
Product Summary

Device	BV _{DSS}	R _{DS(ON)} max	I _D max T _A = +25°C
N-Channel	60V	0.3Ω @ V _{GS} = 10V	1.8A
		0.45Ω @ V _{GS} = 4.5V	1.4A
P-Channel	-60V	0.425Ω @ V _{GS} = -10V	-1.5A
		0.63Ω @ V _{GS} = -4.5V	-1.2A

Description

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

Applications

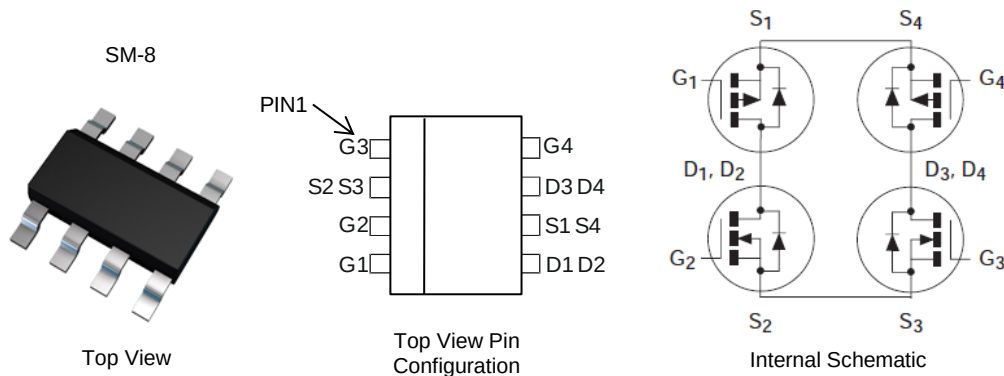
- DC Motor Control
- DC-AC Inverters

Features

- 2 x N + 2 x P Channels in a SOIC Package
- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

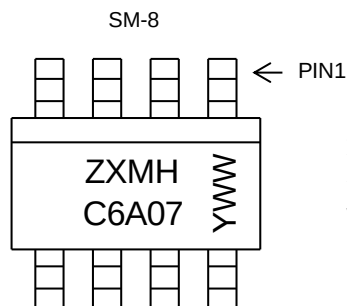
Mechanical Data

- 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 (B3)
- Weight: 0.117 grams (Approximate)


Ordering Information (Note 4)

Part Number	Reel Size	Tape Width	Quantity Per Reel
ZXMHC6A07T8TA	7"	12mm	1,000 units
ZXMHC6A07T8TC	13"	12mm	4,000 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 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


ZXMHC6A07 = 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°C, unless otherwise specified.)

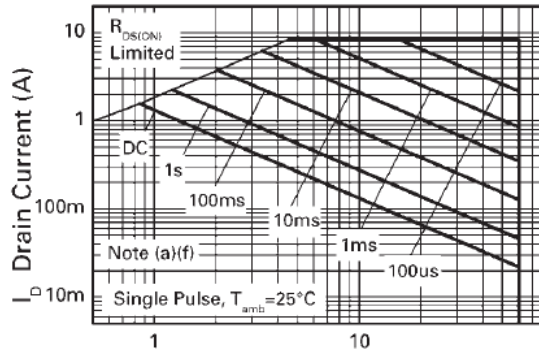
Characteristic			Symbol	N-channel	P-channel	Units
Drain-Source Voltage			V _{DSS}	60	-60	V
Gate-Source Voltage			V _{GSS}	±20	±20	V
Continuous Drain Current, V _{GS} = 10V (Note 8)	Steady State	T _A = +25°C (Note 6)	I _D	1.8	-1.5	A
		T _A = +70°C (Note 6)		1.4	-1.2	
		T _A = +25°C (Note 5)		1.6	-1.3	
Maximum Body Diode Forward Current (Note 6)			I _S	2.3	-2.1	A
Pulsed Drain Current (Note 7)			I _{DM}	8.4	-7.2	A
Pulsed Source Current (Note 7)			I _{SM}	8.4	-7.2	A

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

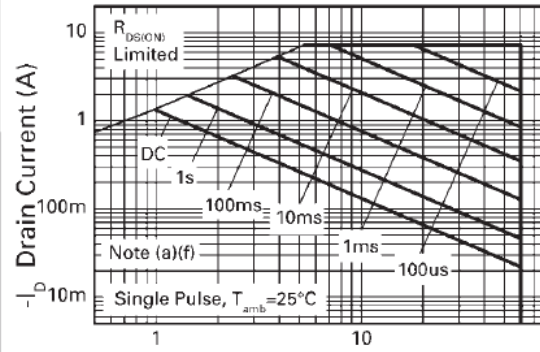
Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 8)	T _A = +25°C (Note 5)	P _D	1.3	W
Linear Derating Factor			10.4	mW/°C
Total Power Dissipation (Note 8)	T _A = +25°C (Note 6)	P _D	1.7	W
Linear Derating Factor			13.6	mW/°C
Thermal Resistance, Junction to Ambient (Note 8)	Steady State (Note 5)	R _{θJA}	94.5	°C/W
	Steady State (Note 6)		73.3	°C/W
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°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, with the heat sink split into two equal areas one for each drain connection.
 6. For a device surface mounted on FR4 PCB measured at t ≤ 10 seconds.
 7. Repetitive rating 50mm x 50mm x 1.6mm FR4 PCB, D = 0.02, pulse width 300μs - pulse width limited by maximum junction temperature. Refer to Transient Thermal Impedance graph.
 8. For device with one active die.

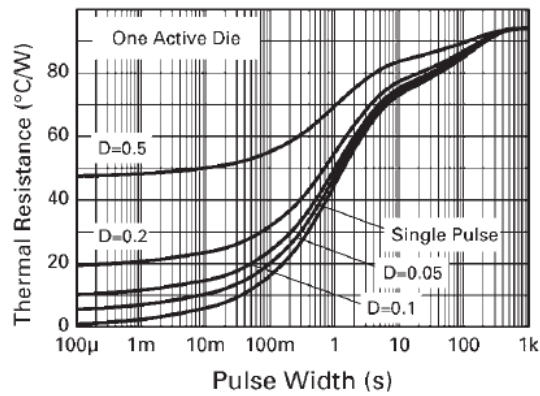
Typical Characteristics



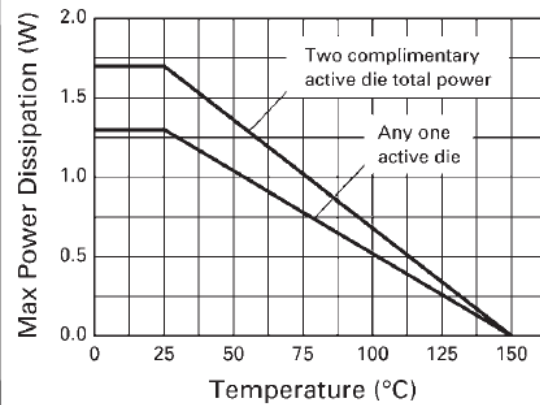
V_{DS} Drain-Source Voltage (V)
N-channel Safe Operating Area



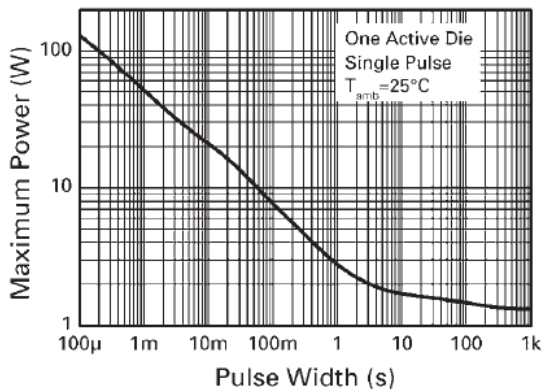
$-V_{DS}$ Drain-Source Voltage (V)
P-channel Safe Operating Area



Transient Thermal Impedance



Derating Curve



Pulse Power Dissipation

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

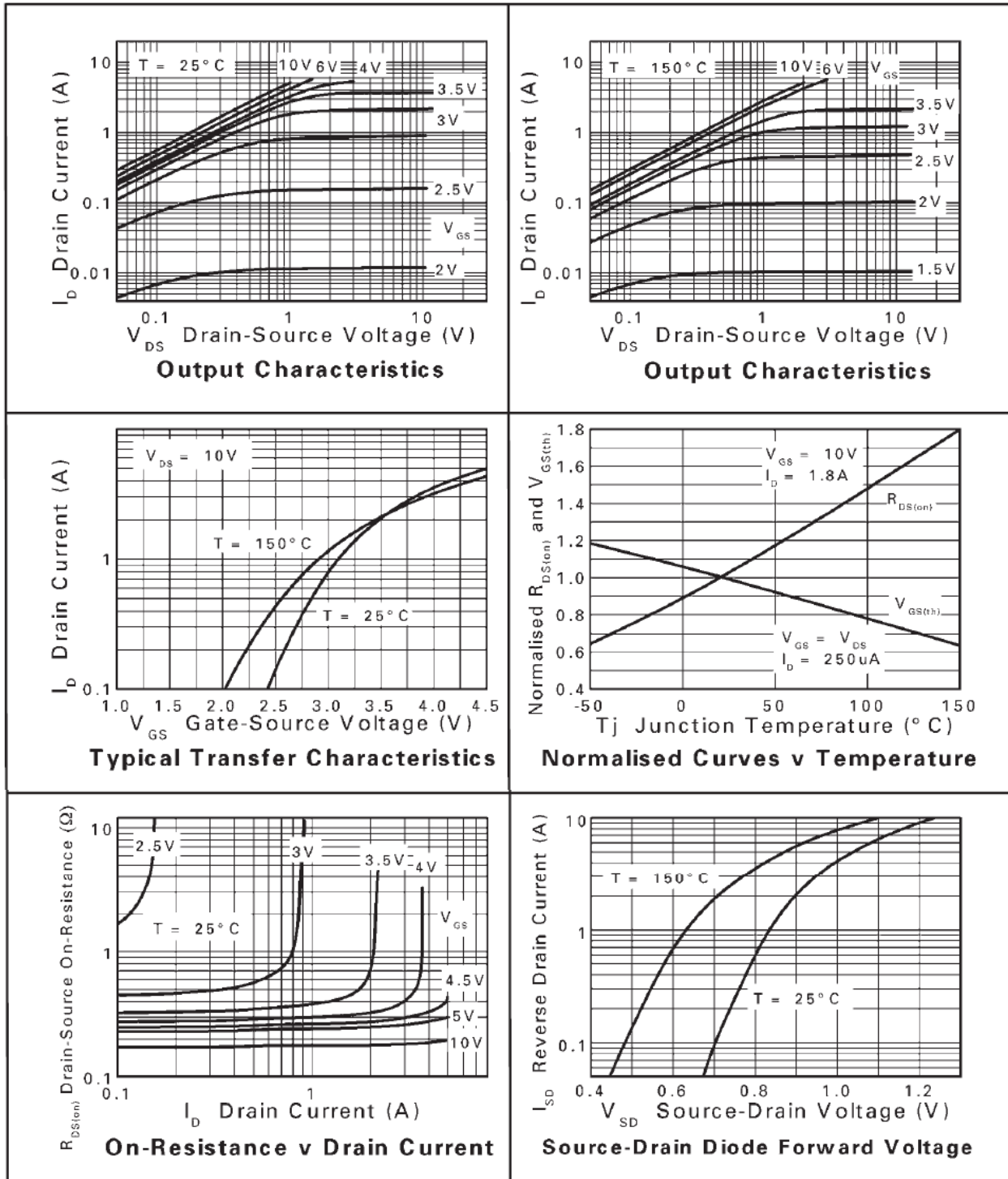
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 10)						
Drain-Source Breakdown Voltage	BV _{DSS}	60	—	—	V	V _{GS} = 0V, I _D = 250μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	1.0	μA	V _{DS} = 60V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	100	nA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS (Note 10)						
Gate Threshold Voltage	V _{GS(th)}	1.0	—	3.0	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance (Note 9)	R _{DS (ON)}	—	—	0.3	Ω	V _{GS} = 10V, I _D = 1.8A
		—	—	0.45		V _{GS} = 4.5V, I _D = 1.3A
Forward Transfer Admittance (Notes 9 & 11)	g _{fs}	—	2.3	—	S	V _{DS} = 15V, I _D = 1.8A
Diode Forward Voltage (Note 9)	V _{SD}	—	0.85	0.95	V	T _J = +25°C, V _{GS} = 0V, I _S = 0.45A
DYNAMIC CHARACTERISTICS (Note 11)						
Input Capacitance	C _{iss}	—	166	—	pF	V _{DS} = 40V, V _{GS} = 0V, f = 1MHz
Output Capacitance	C _{oss}	—	19.5	—		
Reverse Transfer Capacitance	C _{rss}	—	8.7	—		
Gate Charge (V _{GS} = -5.0V)	Q _g	—	1.65	—	nC	V _{DS} = 30V, I _D = 1.8A
Total Gate Charge (V _{GS} = -10V)	Q _g	—	3.2	—	nC	
Gate-Source Charge	Q _{gs}	—	0.67	—		
Gate-Drain Charge	Q _{gd}	—	0.82	—		
Turn-On Delay Time	t _{D(on)}	—	1.8	—	ns	V _{DD} = 30V, V _{GS} = 10V, I _D = 1.8A, R _G = 6.0Ω
Turn-On Rise Time	t _r	—	1.4	—		
Turn-Off Delay Time	t _{D(off)}	—	4.9	—		
Turn-Off Fall Time	t _f	—	2.0	—		
Reverse Recovery Time	t _{rr}	—	20.5	—	ns	T _J = +25°C, I _S = 1.8A, di/dt = 100A/μs
Reverse Recovery Charge	Q _{rr}	—	21.3	—	nC	

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

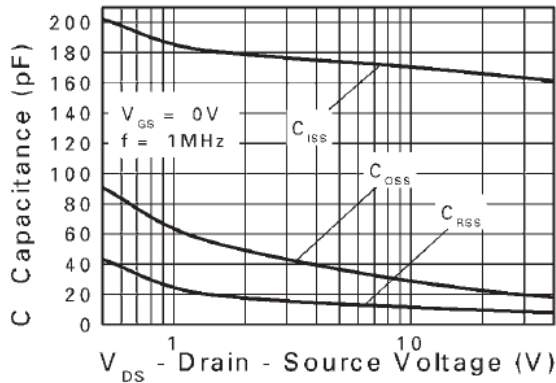
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 10)						
Drain-Source Breakdown Voltage	BV _{DSS}	-60	—	—	V	V _{GS} = 0V, I _D = -250μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	-1.0	μA	V _{DS} = -60V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	100	nA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS (Note 10)						
Gate Threshold Voltage	V _{GS(th)}	-1.0	—	—	V	V _{DS} = V _{GS} , I _D = -250μA
Static Drain-Source On-Resistance (Note 9)	R _{DS(on)}	—	—	0.425	Ω	V _{GS} = -10V, I _D = -0.9A
		—	—	0.63		V _{GS} = -4.5V, I _D = -0.8A
Forward Transfer Admittance (Notes 9 & 11)	g _{fs}	—	1.8	—	S	V _{DS} = -15V, I _D = -0.9A
Diode Forward Voltage (Note 9)	V _{SD}	—	-0.85	-0.95	V	T _J = +25°C, V _{GS} = 0V, I _S = -0.8A
DYNAMIC CHARACTERISTICS (Note 11)						
Input Capacitance	C _{iss}	—	233	—	pF	V _{DS} = -30V, V _{GS} = 0V, f = 1MHz
Output Capacitance	C _{oss}	—	17.4	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	9.6	—	pF	
Gate Charge (V _{GS} = -5.0V)	Q _g	—	2.4	—	nC	V _{DS} = -30V, I _D = -0.9A,
Total Gate Charge (V _{GS} = -10V)	Q _g	—	5.1	—	nC	
Gate-Source Charge	Q _{gs}	—	0.7	—	nC	
Gate-Drain Charge	Q _{gd}	—	0.7	—	nC	
Turn-On Delay Time	t _{D(on)}	—	1.6	—	ns	V _{DD} = -30V, V _{GS} = -10V, R _G = 6.0Ω, I _D = -1.0A
Turn-On Rise Time	t _r	—	2.3	—	ns	
Turn-Off Delay Time	t _{D(off)}	—	13	—	ns	
Turn-Off Fall Time	t _f	—	5.8	—	ns	
Reverse Recovery Time	t _{rr}	—	22.6	—	ns	T _J = +25°C, I _S = -0.9A, di/dt = 100A/μs
Reverse Recovery Charge	Q _{rr}	—	23.2	—	nC	

- Notes: 9. Measured under pulsed conditions. Width ≤ 300μs. Duty cycle ≤ 2%.
10. Short duration pulse test used to minimize self-heating effect.
11. Guaranteed by design. Not subject to product testing.

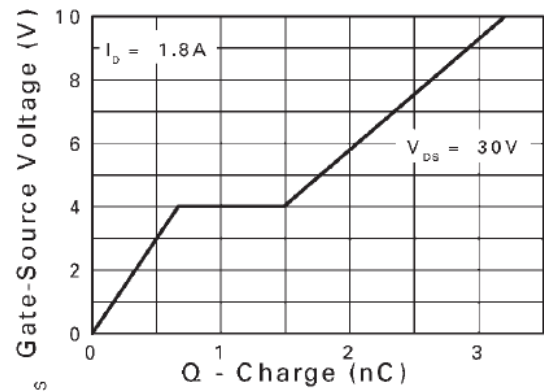
Typical Characteristics (N-Channel)



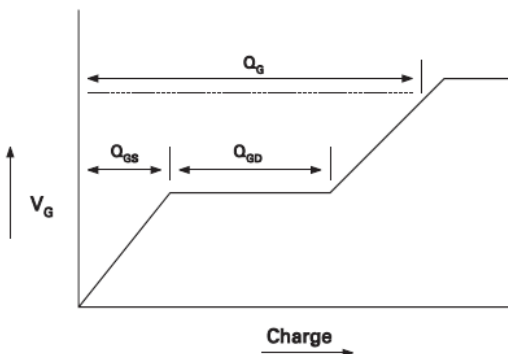
Typical Characteristics (N-Channel)



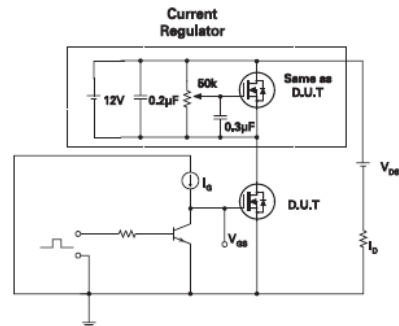
Capacitance v Drain-Source Voltage



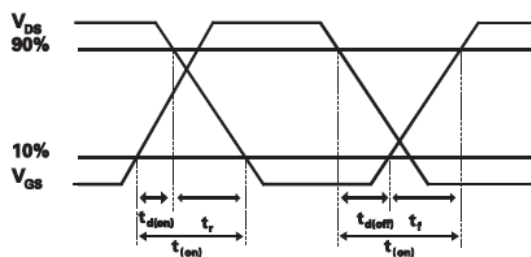
Gate-Source Voltage v Gate Charge



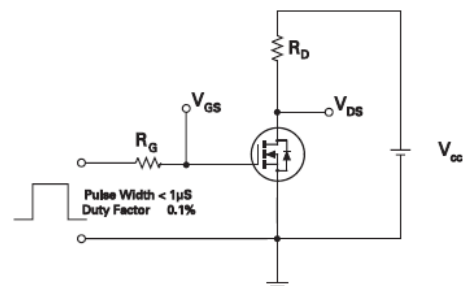
Basic Gate Charge Waveform



Gate Charge Test Circuit

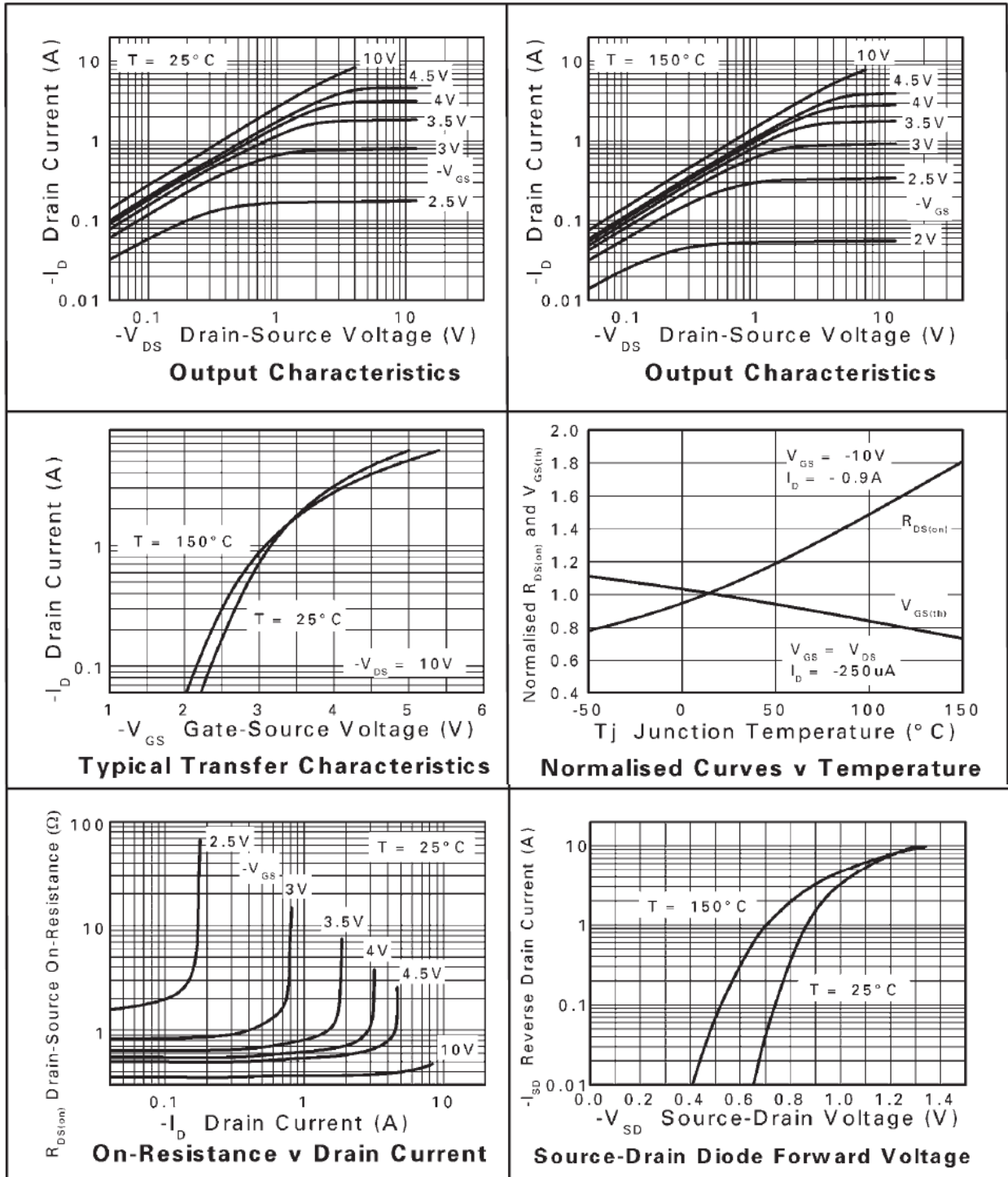


Switching Time Waveforms

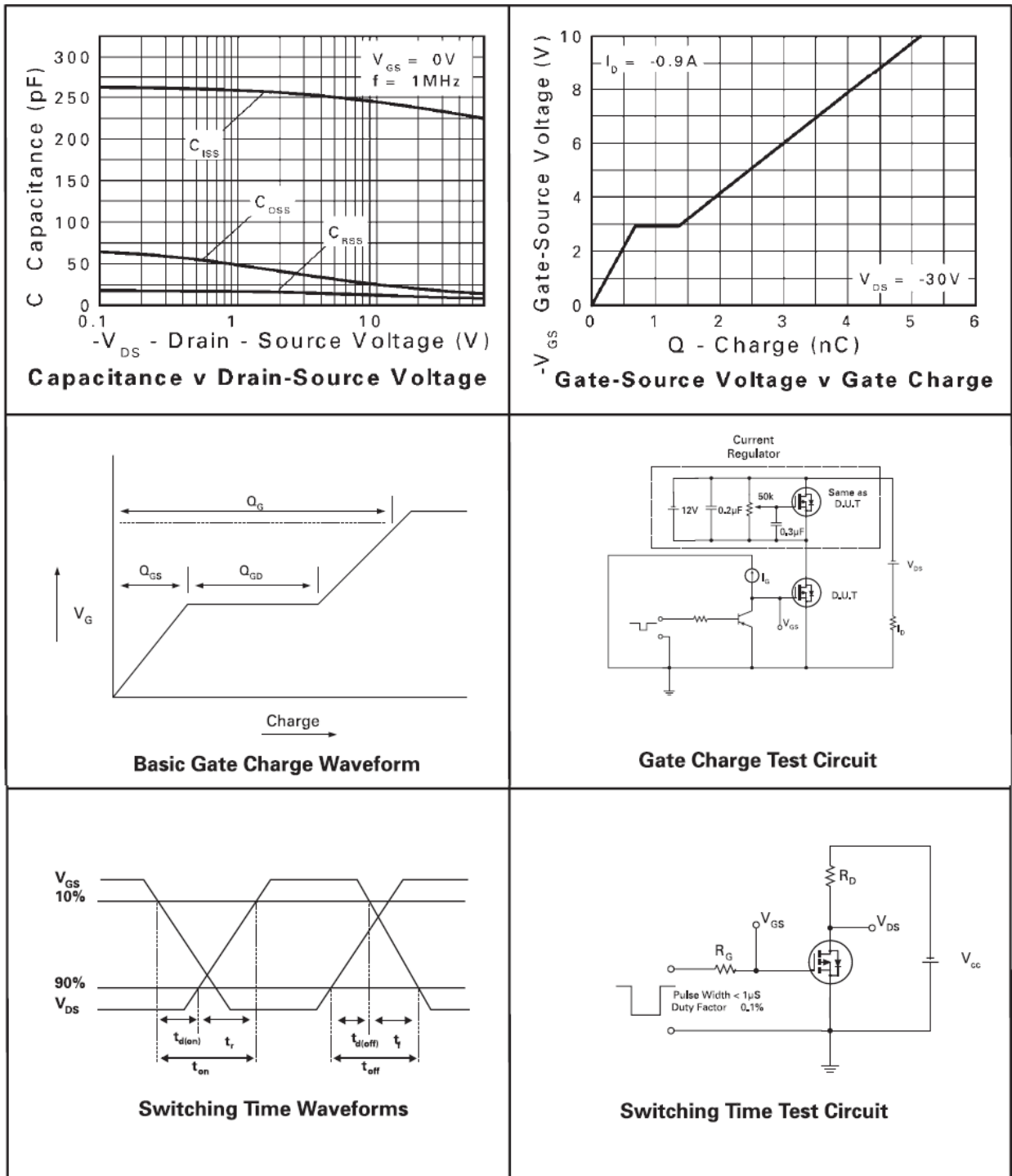


Switching Time Test Circuit

Typical Characteristics (P-Channel)

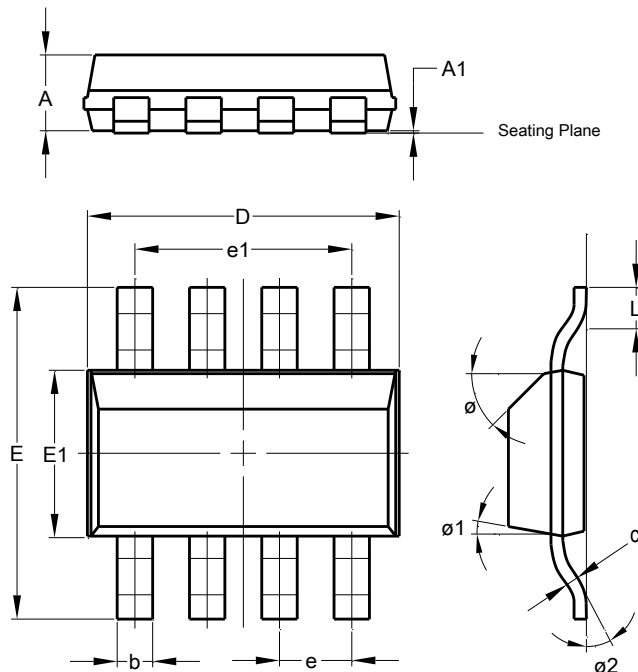


Typical Characteristics (P-Channel)



Package Outline Dimensions

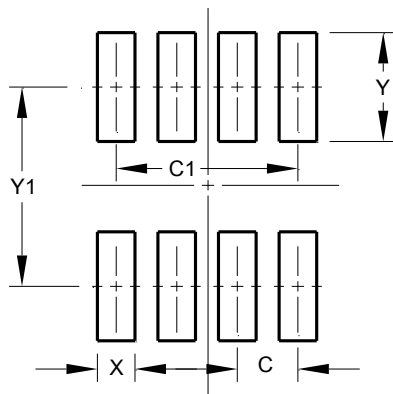
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



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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