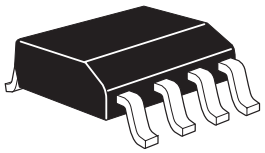
ZXMHC3A01T8

COMPLEMENTARY 30V ENHANCEMENT MODE MOSFET H-BRIDGE

SUMMARY

N-Channel = $V_{(BR)DSS}$= 30V : $R_{DS(on)}$= 0.12Ω; I_D= 3.1A
P-Channel = $V_{(BR)DSS}$= -30V : $R_{DS(on)}$= 0.21Ω; I_D= -2.3A



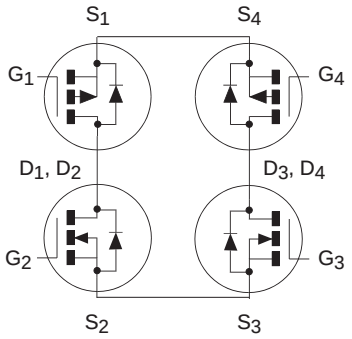
SM8

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.

FEATURES

- Low on-resistance
- Fast switching speed
- Low threshold
- Low gate drive
- Single SM-8 surface mount package



APPLICATIONS

- Single phase DC fan motor drive

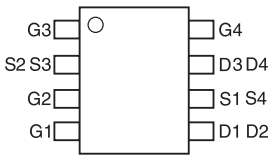
ORDERING INFORMATION

DEVICE	REEL SIZE	TAPE WIDTH	QUANTITY PER REEL
ZXMHC3A01T8TA	7”	12mm	1,000 units
ZXMHC3A01T8TC	13”	12mm	4,000 units

DEVICE MARKING

- ZXMH
  C3A01

PINOUT



Top View

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	N-Channel	P-channel	UNIT
Drain-source voltage	V_{DSS}	30	-30	V
Gate-source voltage	V_{GS}	±20	±20	V
Continuous drain current (V_{GS}= 10V; T_A=25°C)[b][d]	I_D	3.1	-2.3	A
(V_{GS}= 10V; T_A=70°C) [b][d]		2.5	-1.8	A
(V_{GS}= 10V; T_A=25°C) [a][d]		2.7	-2.0	A
Pulsed drain current [c]	I_{DM}	14.5	-10.8	A
Continuous source current (body diode) [b]	I_S	2.3	-2.2	A
Pulsed source current (body diode) [c]	I_{SM}	14.5	-10.8	A
Power dissipation at T_A =25°C [a] [d]	P_D	1.3		W
Linear derating factor		10.4		mW/°C
Power dissipation at T_A =25°C [b] [d]	P_D	1.7		W
Linear derating factor		13.6		mW/°C
Operating and storage temperature range	T_j, T_{stg}	-55 to +150		°C

THERMAL RESISTANCE

PARAMETER	SYMBOL	VALUE	UNIT
Junction to ambient [a] [d]	$R_{\theta JA}$	96	°C/W
Junction to ambient [b] [d]	$R_{\theta JA}$	73	°C/W

NOTES

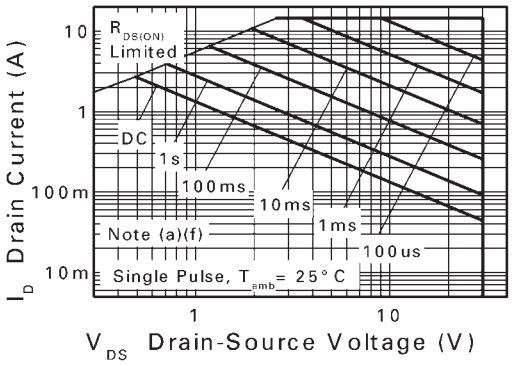
(a) For a device surface mounted on 50mm x 50mm x 1.6mm FR4 PCB with high coverage of single sided 2oz copper, in still air conditions.

(b) For a device surface mounted on FR4 PCB measured at t ≤10 sec.

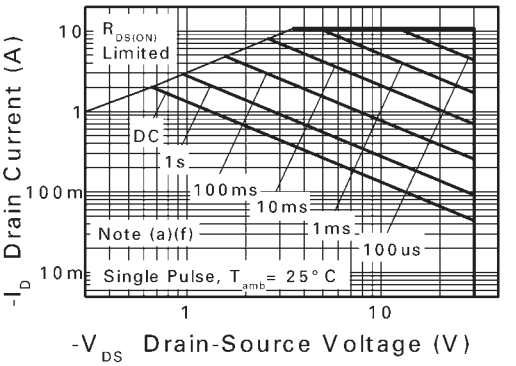
(c) Repetitive rating on 50mm x 50mm x 1.6mm FR4, D= 0.02, pulse width 300μS - pulse width limited by maximum junction temperature. Refer to transient thermal impedance graph.

(d) For device with one active die.

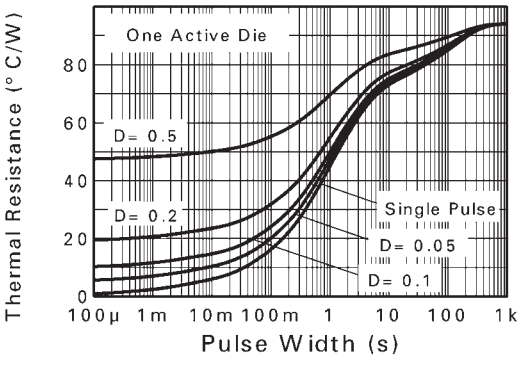
CHARACTERISTICS



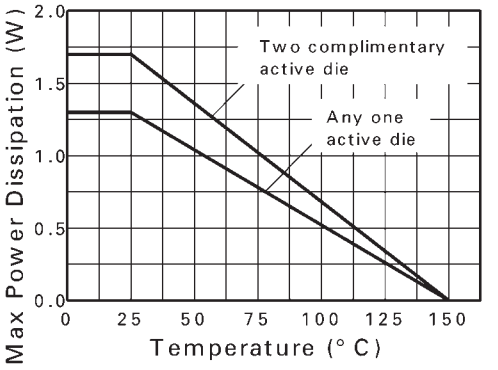
N-channel Safe Operating Area



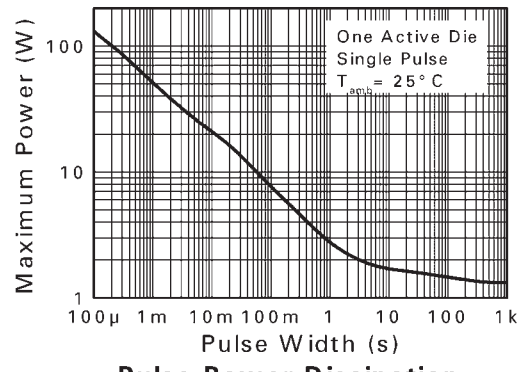
P-channel Safe Operating Area



Transient Thermal Impedance



Derating Curve



Pulse Power Dissipation

N-channel

ELECTRICAL CHARACTERISTICS (at T_{amb} = 25°C unless otherwise stated)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
STATIC						
Drain-source breakdown voltage	$V_{(BR)DSS}$	30			V	I_D= 250μA, V_{GS}=0V
Zero gate voltage drain current	I_{DSS}			1.0	μA	V_{DS}=30V, V_{GS}=0V
Gate-body leakage	I_{GSS}			100	nA	V_{GS}=±20V, V_{DS}=0V
Gate-source threshold voltage	$V_{GS(th)}$	1.0		3.0	V	I_D= 250μA, V_{DS}=V_{GS}
Static drain-source on-state resistance (1)	$R_{DS(on)}$			0.12 0.18	Ω Ω	V_{GS}= 10V, I_D= 2.5A V_{GS}= 4.5V, I_D= 2.0A
Forward transconductance (1) (3)	g_{fs}		3.5		S	V_{DS}=4.5V, I_D= 2.5A
DYNAMIC (3)						
Input capacitance	C_{iss}		190		pF	V_{DS}= 25V, V_{GS}=0V f=1MHz
Output capacitance	C_{oss}		38		pF	
Reverse transfer capacitance	C_{rss}		20		pF	
SWITCHING(2) (3)						
Turn-on-delay time	$t_{d(on)}$		1.7		ns	V_{DD}= 15V, I_D= 2.5A $R_G \cong 6.0\Omega$, V_{GS}= 10V
Rise time	t_r		2.3		ns	
Turn-off delay time	$t_{d(off)}$		6.6		ns	
Fall time	t_f		2.9		ns	
Total gate charge	Q_g		3.9		nC	V_{DS}= 15V, V_{GS}= 10V I_D= 2.5A
Gate-source charge	Q_{gs}		0.6		nC	
Gate drain charge	Q_{gd}		0.9		nC	
SOURCE-DRAIN DIODE						
Diode forward voltage (1)	V_{SD}			0.95	V	T_j=25°C, I_S= 1.7A, V_{GS}=0V
Reverse recovery time (3)	t_{rr}		17.7		ns	T_j=25°C, I_S= 2.5A, di/dt=100A/μs
Reverse recovery charge (3)	Q_{rr}		13.0		nC	

NOTES

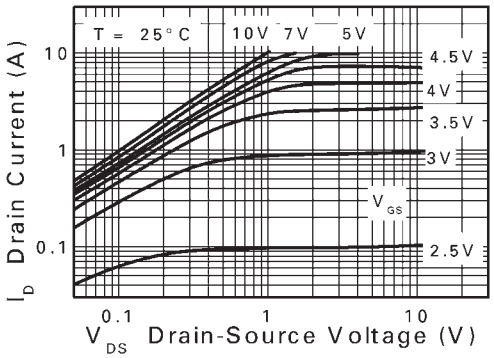
(1) Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%.

(2) Switching characteristics are independent of operating junction temperature.

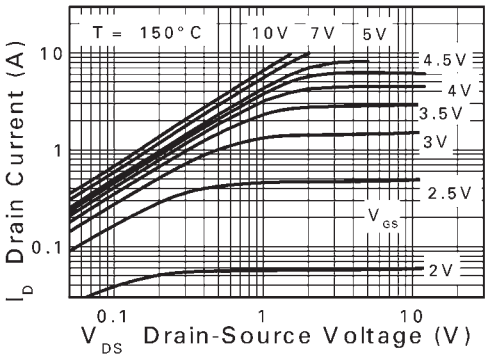
(3) For design aid only, not subject to production testing.

N-channel

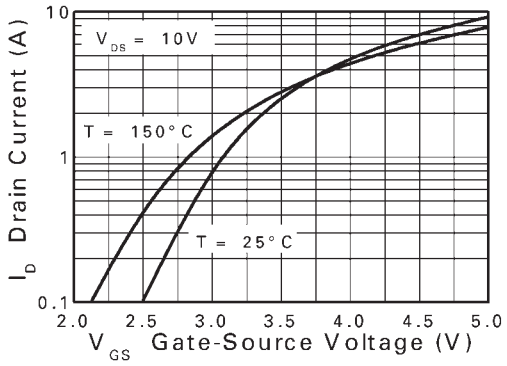
TYPICAL CHARACTERISTICS



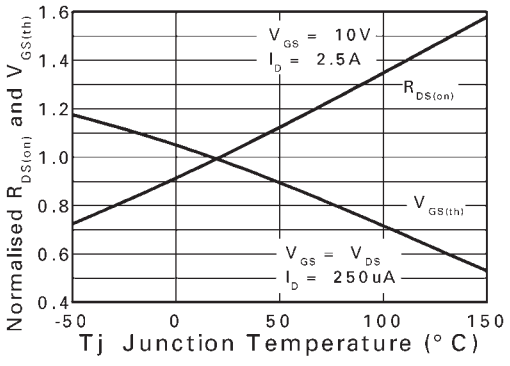
Output Characteristics



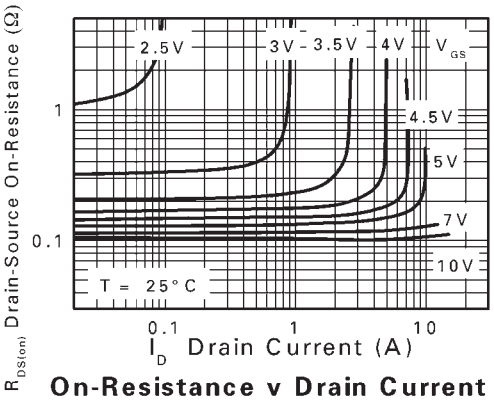
Output Characteristics



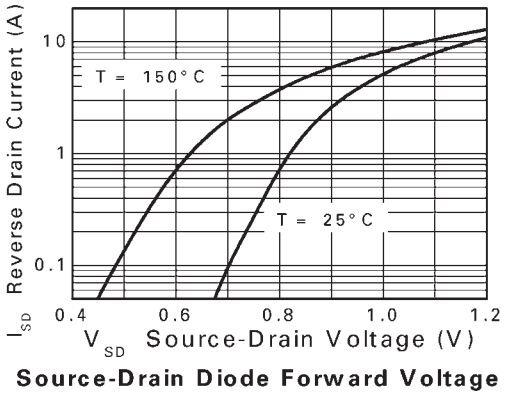
Typical Transfer Characteristics



Normalised Curves v Temperature



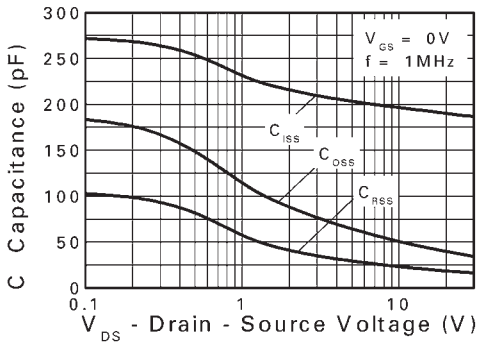
On-Resistance v Drain Current



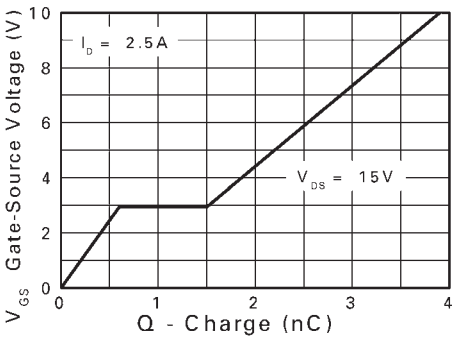
Source-Drain Diode Forward Voltage

N-channel

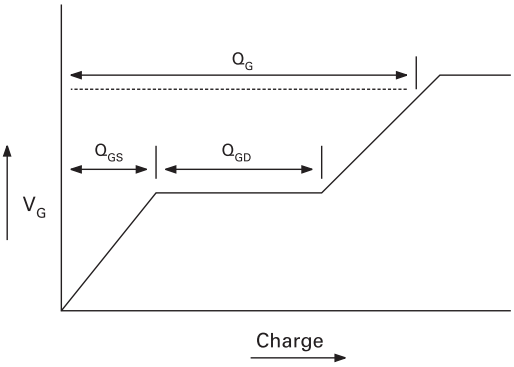
TYPICAL CHARACTERISTICS



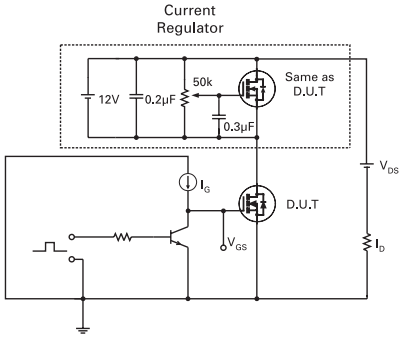
Capacitance v Drain-Source Voltage



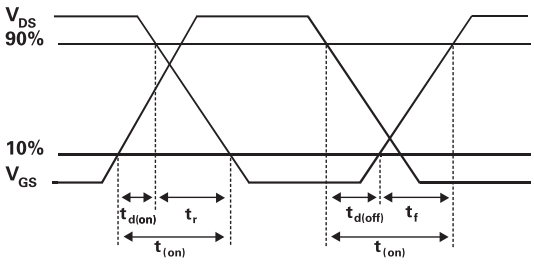
Gate-Source Voltage v Gate Charge



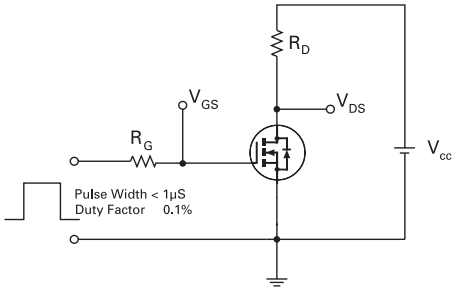
Basic Gate Charge Waveform



Gate Charge Test Circuit



Switching Time Waveforms



Switching Time Test Circuit

P-channel

ELECTRICAL CHARACTERISTICS (at T_{amb} = 25°C unless otherwise stated)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
STATIC						
Drain-source breakdown voltage	$V_{(BR)DSS}$	-30			V	I_D= -250μA, V_{GS}=0V
Zero gate voltage drain current	I_{DSS}			-1.0	μA	V_{DS}= -30V, V_{GS}=0V
Gate-body leakage	I_{GSS}			100	nA	V_{GS}=±20V, V_{DS}=0V
Gate-source threshold voltage	$V_{GS(th)}$	-1.0		-3.0	V	I_D= -250μA, V_{DS}=V_{GS}
Static drain-source on-state resistance (1)	$R_{DS(on)}$			0.21 0.33	Ω Ω	V_{GS}= -10V, I_D= -1.4A V_{GS}= -4.5V, I_D= -1.1A
Forward transconductance (1) (3)	g_{fs}		2.5		S	V_{DS}= -15V, I_D= -1.4A
DYNAMIC (3)						
Input capacitance	C_{iss}		204		pF	V_{DS}= -15V, V_{GS}=0V
Output capacitance	C_{oss}		39.8		pF	f=1MHz
Reverse transfer capacitance	C_{rss}		25.8		pF	
SWITCHING(2) (3)						
Turn-on-delay time	$t_{d(on)}$		1.2		ns	V_{DD}= -15V, I_D= -1A
Rise time	t_r		2.3		ns	$R_G \cong 6.0\Omega$, V_{GS}= -10V
Turn-off delay time	$t_{d(off)}$		12.1		ns	
Fall time	t_f		7.5		ns	
Total gate charge			2.6		nC	V_{DS}= -15V, V_{GS}= -5V I_D= -1.4A
Total gate charge	Q_g		5.2		nC	V_{DS}= -15V, V_{GS}= -10V
Gate-source charge	Q_{gs}		0.7		nC	I_D= -1.4A
Gate drain charge	Q_{gd}		0.9		nC	
SOURCE-DRAIN DIODE						
Diode forward voltage (1)	V_{SD}		-0.85	-0.95	V	T_j=25°C, I_S= -1.1A, V_{GS}=0V
Reverse recovery time (3)	t_{rr}		19		ns	T_j=25°C, I_S= -0.95A,
Reverse recovery charge (3)	Q_{rr}		15		nC	di/dt=100A/μs

NOTES

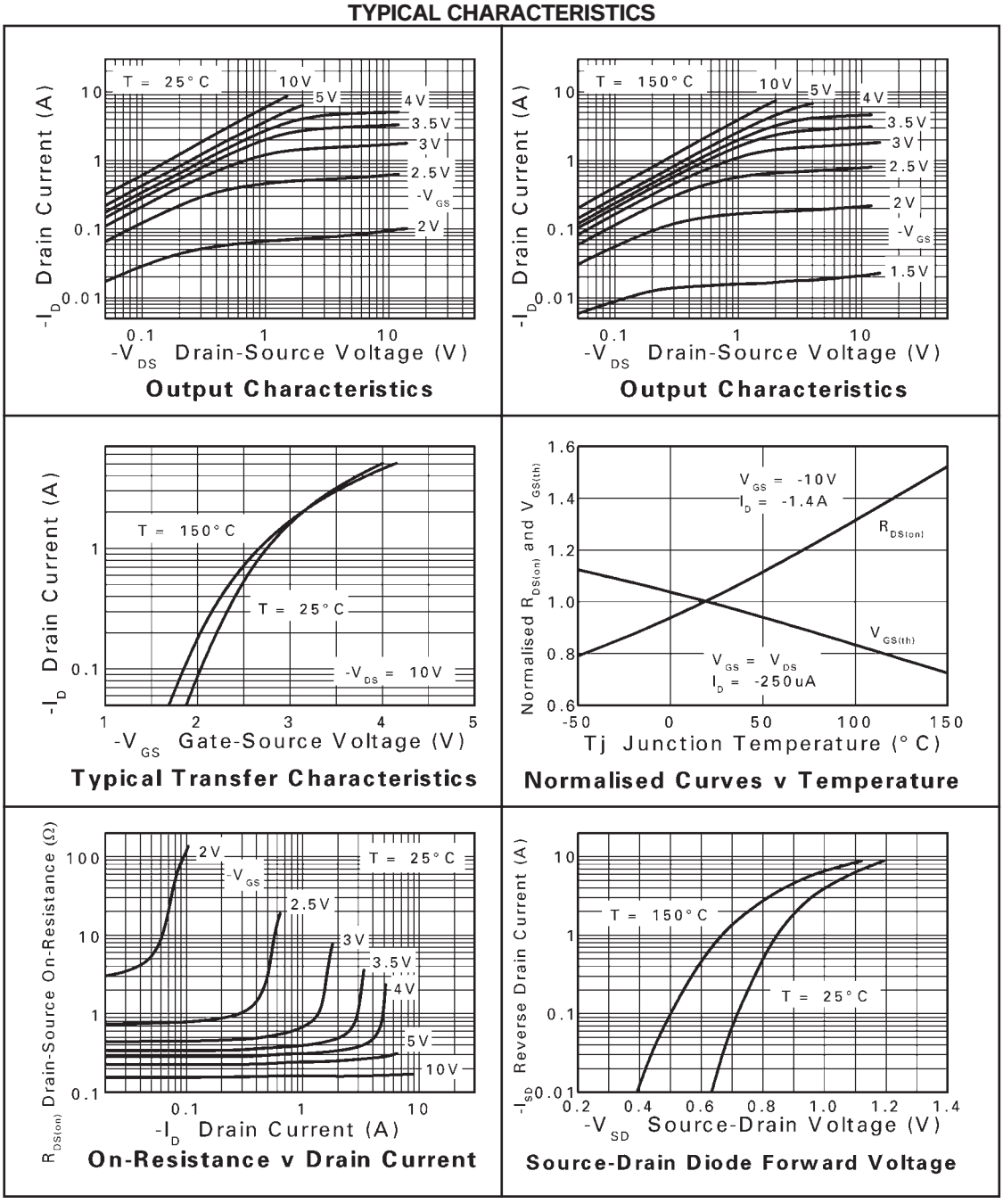
(1) Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%.

(2) Switching characteristics are independent of operating junction temperature.

(3) For design aid only, not subject to production testing.

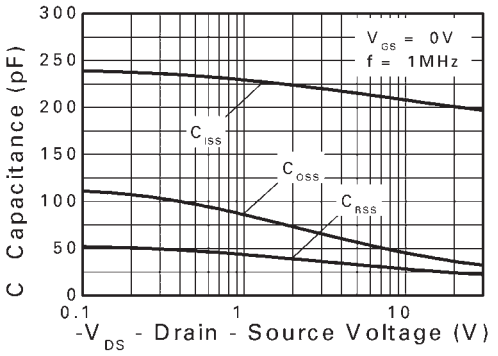
P-channel

TYPICAL CHARACTERISTICS

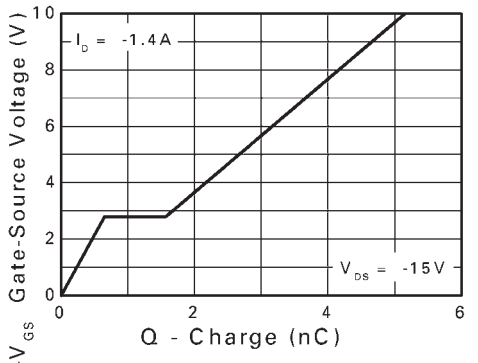


P-channel

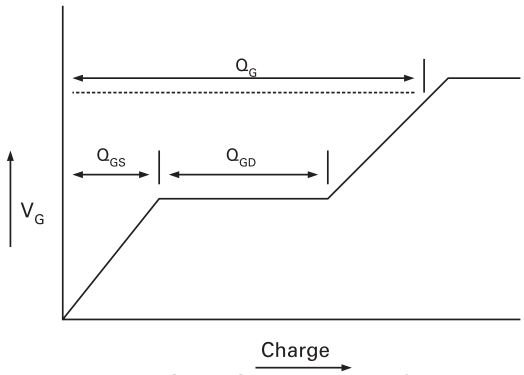
TYPICAL CHARACTERISTICS



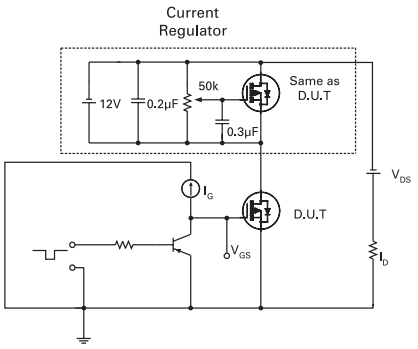
Capacitance v Drain-Source Voltage



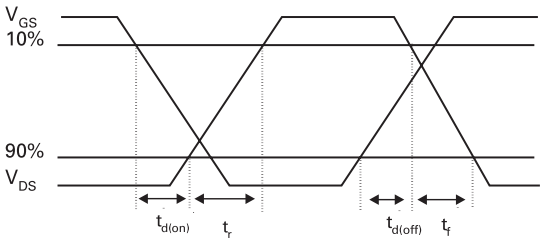
Gate-Source Voltage v Gate Charge



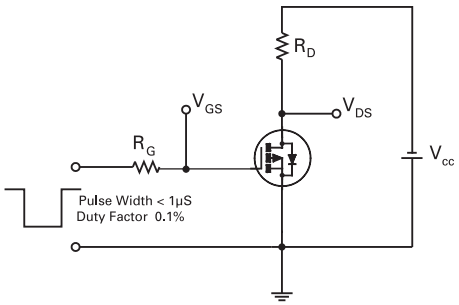
Basic Gate Charge Waveform



Gate Charge Test Circuit



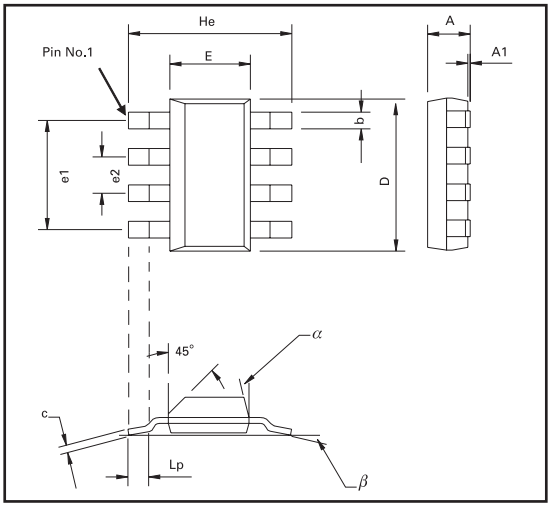
Switching Time Waveforms



Switching Time Test Circuit

ZXMHC3A01T8

PACKAGE OUTLINE



Controlling dimensions are in millimeters. Approximate conversions are given in inches

PACKAGE DIMENSIONS

DIM	Millimeters			Inches			DIM	Millimeters			Inches		
	Min	Max	Typ.	Min	Max	Typ.		Min	Max	Typ.	Min	Max	Typ.
A	-	1.7	-	-	0.067	-	e1	-	-	4.59	-	-	0.1807
A1	0.02	0.1	-	0.008	0.004	-	e2	-	-	1.53	-	-	0.0602
b	-	-	0.7	-	-	0.0275	He	6.7	7.3	-	0.264	0.287	-
c	0.24	0.32	-	0.009	0.013	-	Lp	0.9	-	-	0.035	-	-
D	6.3	6.7	-	0.248	0.264	-	α	-	15°	-	-	15°	-
E	3.3	3.7	-	0.130	0.145	-	β	-	-	10°	-	-	10°

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