ZXMC4559DN8

COMPLEMENTARY 60V ENHANCEMENT MODE MOSFET

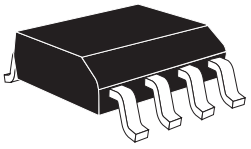
SUMMARY

N-Channel $V_{(BR)DSS}$ = 60V; $R_{DS(ON)}$ = 0.055Ω; I_D= 4.7A

P-Channel $V_{(BR)DSS}$ = -60V; $R_{DS(ON)}$ = 0.105Ω; I_D= -3.9A

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.



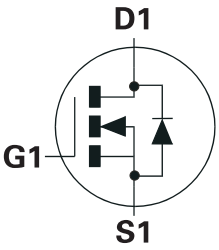
SO8

FEATURES

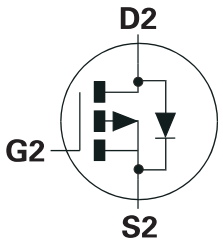
- Low on-resistance
- Fast switching speed
- Low threshold
- Low gate drive
- Low profile SOIC package

APPLICATIONS

- Motor Drive
- LCD backlighting



Q1 = N-CHANNEL



Q2 = P-CHANNEL

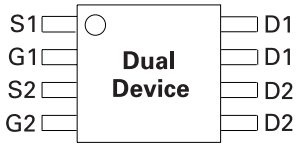
ORDERING INFORMATION

DEVICE	REEL	TAPE WIDTH	QUANTITY PER REEL
ZXMC4559DN8TA	7''	12mm	500 units
ZXMC4559DN8TC	13''	12mm	2500 units

DEVICE MARKING

- ZXMC
  4559

PINOUT



Top view

ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	N-Channel	P-Channel	UNIT
Drain-Source Voltage	V_{DSS}	60	-60	V
Gate-Source Voltage	V_{GS}	±20	±20	V
Continuous Drain Current @V_{GS}=10V; T_A=25°C (b) (d)	I_D	4.7	-3.9	A
@V_{GS}=10V; T_A=25°C (b) (d)		3.7	-2.8	A
@V_{GS}=10V; T_A=25°C (a) (d)		3.6	-2.6	A
Pulsed Drain Current (c)	I_{DM}	22.2	-18.3	A
Continuous Source Current (Body Diode) (b)	I_S	3.4	-3.2	A
Pulsed Source Current (Body Diode)(c)	I_{SM}	22.2	-18.3	A
Power Dissipation at TA=25°C (a) (d)	P_D	1.25		W
Linear Derating Factor		10		mW/°C
Power Dissipation at TA=25°C (a) (e)	P_D	1.8		W
Linear Derating Factor		14		mW/°C
Power Dissipation at TA=25°C (b) (d)	P_D	2.1		W
Linear Derating Factor		17		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)	$R_{\Theta JA}$	100	°C/W
Junction to Ambient (b) (e)	$R_{\Theta JA}$	69	°C/W
Junction to Ambient (b) (d)	$R_{\Theta JA}$	58	°C/W

Notes

(a) For a dual device surface mounted on 25mm x 25mm FR4 PCB with coverage of single sided 1oz copper in still air conditions.

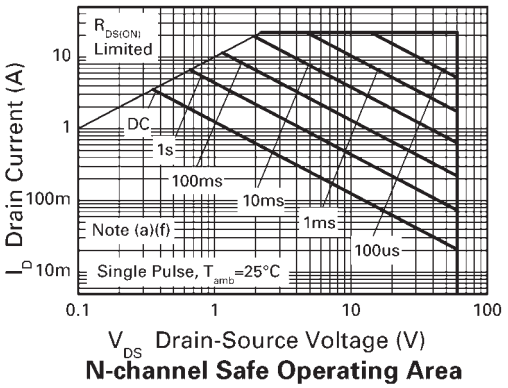
(b) For a dual device surface mounted on FR4 PCB measured at t ≤10 sec.

(c) Repetitive rating 25mm x 25mm FR4 PCB, D=0.02 pulse width=300μs - pulse width limited by maximum junction temperature.

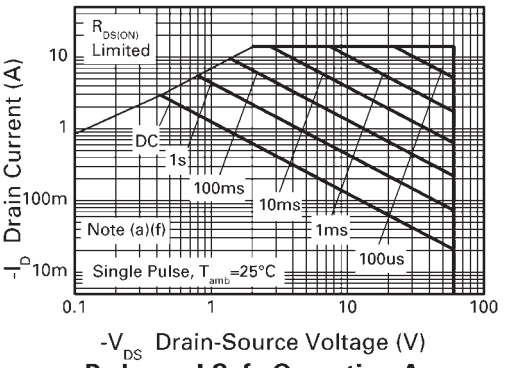
(d) For a device with one active die.

(e) For device with 2 active die running at equal power.

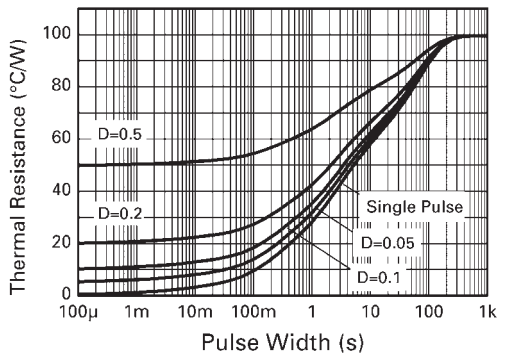
CHARACTERISTICS



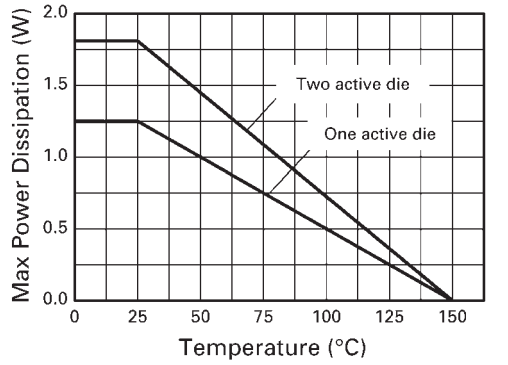
N-channel Safe Operating Area



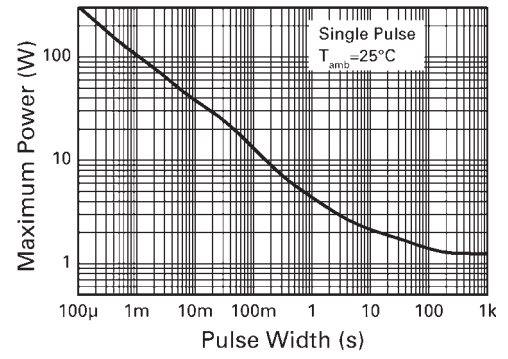
P-channel Safe Operating Area



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	$V_{(BR)DSS}$	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-Body Leakage	I_{GSS}			100	nA	V_{GS}=±20V, V_{DS}=0V
Gate-Source Threshold Voltage	$V_{GS(th)}$	1.0			V	I_D=250μA, V_{DS}= V_{GS}
Static Drain-Source On-State Resistance (1)	$R_{DS(on)}$			0.055 0.075	Ω Ω	V_{GS}=10V, I_D=4.5A V_{GS}=4.5V, I_D=4.0A
Forward Transconductance (1) (3)	g_{fs}		10.2		S	V_{DS}=15V,I_D=4.5A
DYNAMIC (3)						
Input Capacitance	C_{iss}		1063		pF	V_{DS}=30V, V_{GS}=0V, f=1MHz
Output Capacitance	C_{oss}		104		pF	
Reverse Transfer Capacitance	C_{rss}		64		pF	
SWITCHING (2) (3)						
Turn-On Delay Time	$t_{d(on)}$		3.5		ns	V_{DD} =30V, I_D=1A R_G≅6.0Ω, V_{GS}=10V
Rise Time	t_r		4.1		ns	
Turn-Off Delay Time	$t_{d(off)}$		26.2		ns	
Fall Time	t_f		10.6		ns	
Gate Charge	Q_g		11.0		nC	V_{DS}=30V,V_{GS}=5V, I_D=4.5A
Total Gate Charge	Q_g		20.4		nC	V_{DS}=30V,V_{GS}=10V, I_D=4.5A
Gate-Source Charge	Q_{gs}		4.1		nC	
Gate-Drain Charge	Q_{gd}		5.1		nC	
SOURCE-DRAIN DIODE						
Diode Forward Voltage (1)	V_{SD}		0.85	1.2	V	T_J=25°C, I_S=5.5A, V_{GS}=0V
Reverse Recovery Time (3)	t_{rr}		22		ns	T_J=25°C, I_F=2.2A, di/dt= 100A/μs
Reverse Recovery Charge (3)	Q_{rr}		21.4		nC	

NOTES

(1) Measured under pulsed conditions. 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
ELECTRICAL CHARACTERISTICS (at T_{amb} = 25°C unless otherwise stated)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
STATIC						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	-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-Body Leakage	I_{GSS}			100	nA	V_{GS}=±20V, V_{DS}=0V
Gate-Source Threshold Voltage	$V_{GS(th)}$	-1.0			V	I_D=-250μA, V_{DS}= V_{GS}
Static Drain-Source On-State Resistance (1)	$R_{DS(on)}$			0.085 0.125	Ω Ω	V_{GS}=-10V, I_D=-2.9A V_{GS}=-4.5V, I_D=-2.4A
Forward Transconductance (1) (3)	g_{fs}		7.2		S	V_{DS}=-15V,I_D=-2.9A
DYNAMIC (3)						
Input Capacitance	C_{iss}		1021		pF	V_{DS}=-30 V, V_{GS}=0V, f=1MHz
Output Capacitance	C_{oss}		83.1		pF	
Reverse Transfer Capacitance	C_{rss}		56.4		pF	
SWITCHING(2) (3)						
Turn-On Delay Time	$t_{d(on)}$		3.5		ns	V_{DD} =-30V, I_D=-1A R_G 6.0Ω, V_{GS}=-10V
Rise Time	t_r		4.1		ns	
Turn-Off Delay Time	$t_{d(off)}$		35		ns	
Fall Time	t_f		10		ns	
Gate Charge	Q_g		12.1		nC	V_{DS}=-30V,V_{GS}=-5V, I_D=-2.9A
Total Gate Charge	Q_g		24.2		nC	V_{DS}=-30V,V_{GS}=-10V, I_D=-2.9A
Gate-Source Charge	Q_{gs}		2.5		nC	
Gate-Drain Charge	Q_{gd}		3.7		nC	
SOURCE-DRAIN DIODE						
Diode Forward Voltage (1)	V_{SD}		-0.85	-0.95	V	T_J=25°C, I_S=-3.4A, V_{GS}=0V
Reverse Recovery Time (3)	t_{rr}		29.2		ns	T_J=25°C, I_F=-2A, di/dt= 100A/μs
Reverse Recovery Charge (3)	Q_{rr}		39.6		nC	

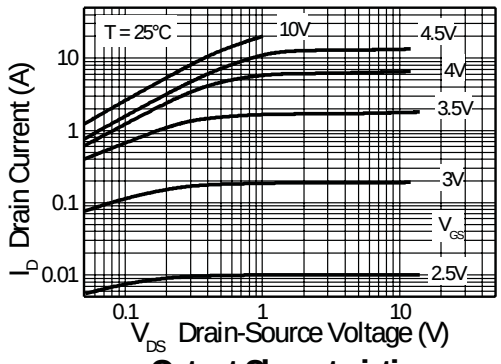
NOTES

(1) Measured under pulsed conditions. Width ≤300μs. Duty cycle ≤ 2% .

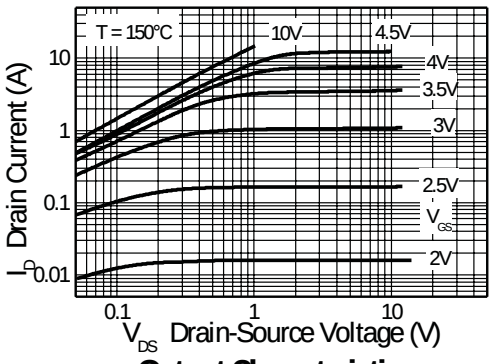
(2) Switching characteristics are independent of operating junction temperature.

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

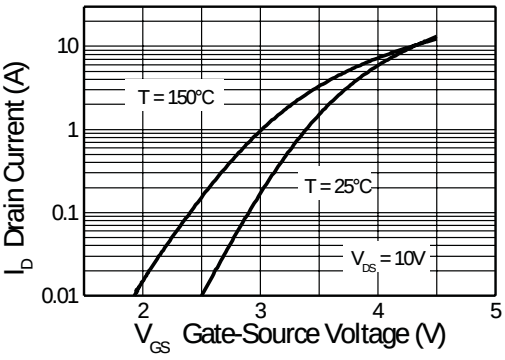
N-CHANNEL TYPICAL CHARACTERISTICS



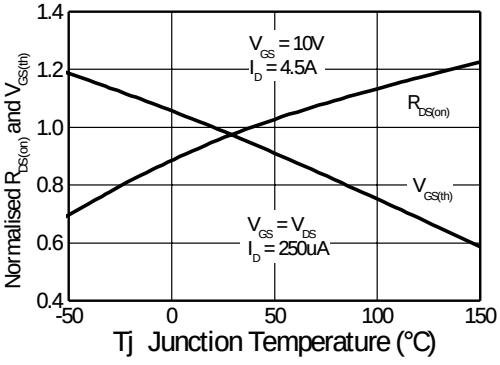
Output Characteristics



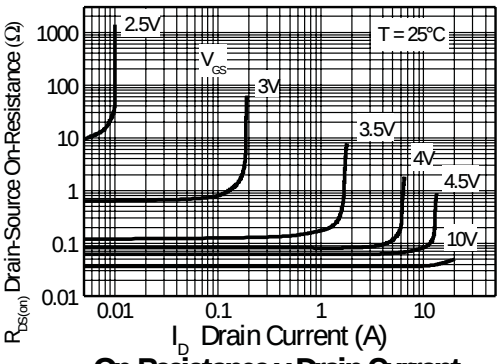
Output Characteristics



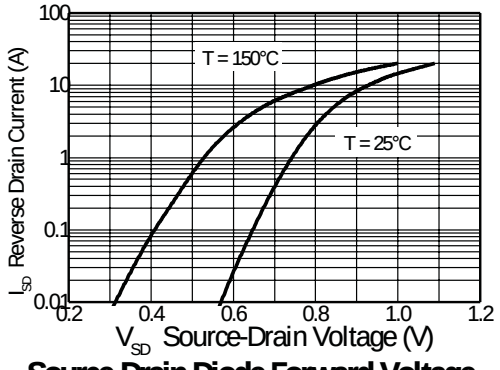
Typical Transfer Characteristics



Normalised Curves v Temperature

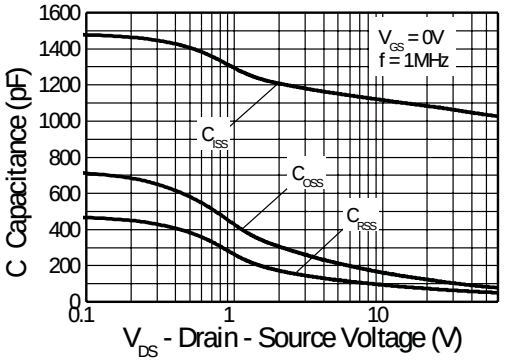


On-Resistance v Drain Current

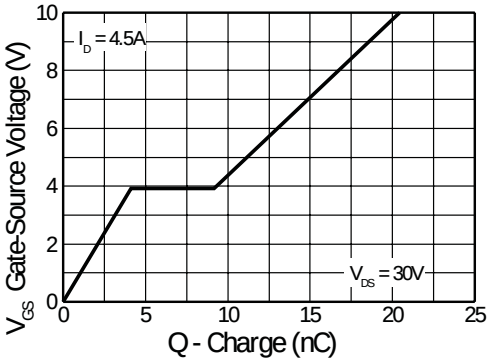


Source-Drain Diode Forward Voltage

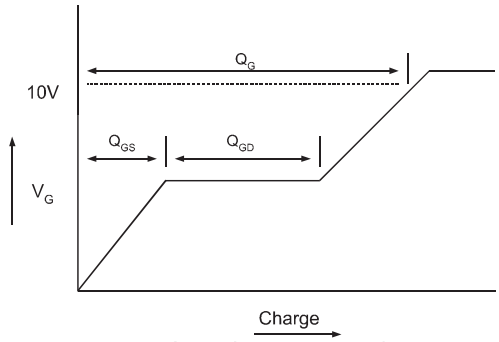
N-CHANNEL TYPICAL CHARACTERISTICS



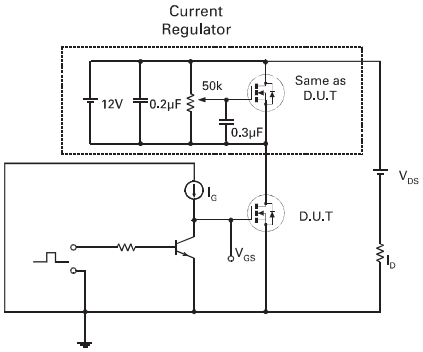
Capacitance v Drain-Source Voltage



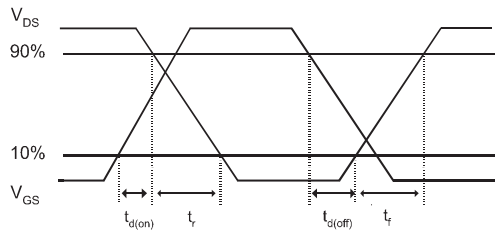
Gate-Source Voltage v Gate Charge



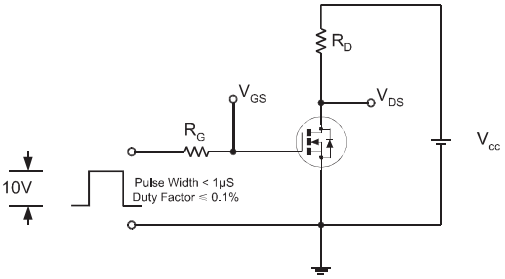
Basic Gate Charge Waveform



Gate Charge Test Circuit

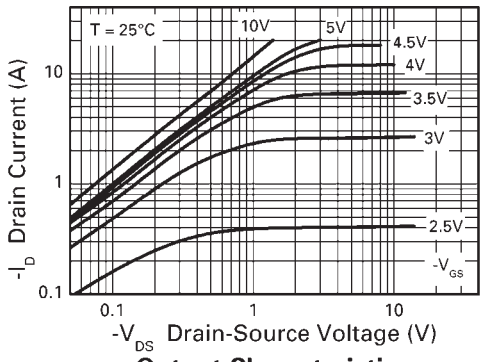


Switching Time Waveforms

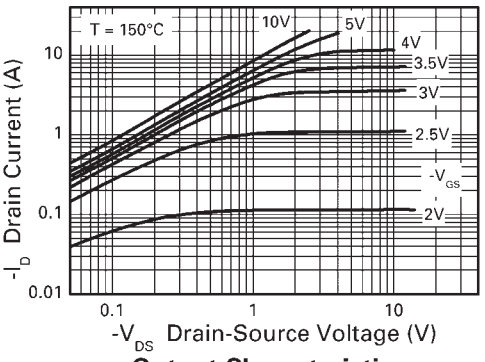


Switching Time Test Circuit

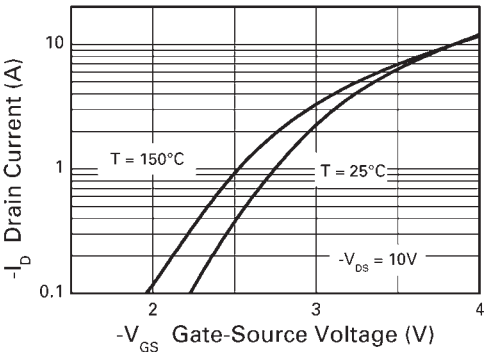
P-CHANNEL TYPICAL CHARACTERISTICS



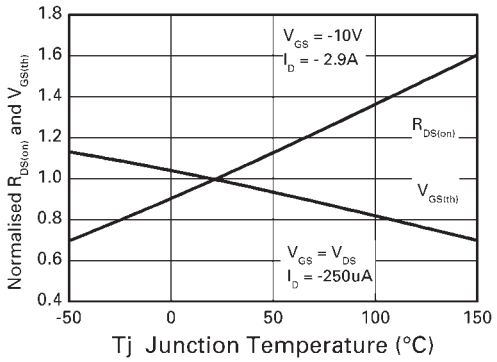
Output Characteristics



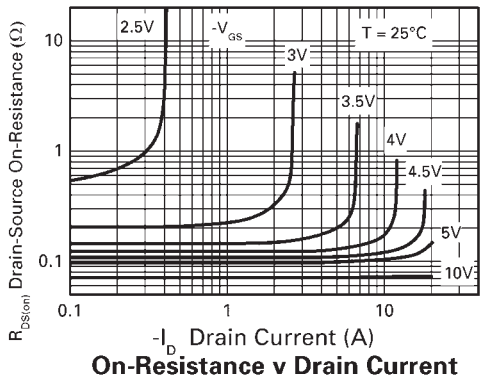
Output Characteristics



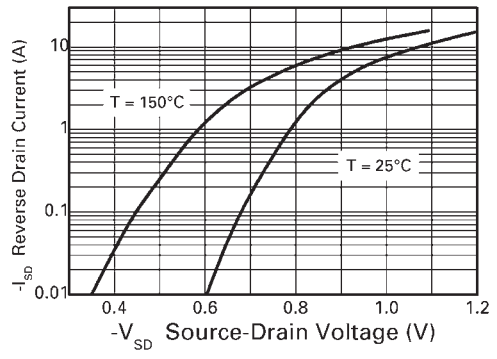
Typical Transfer Characteristics



Normalised Curves v Temperature

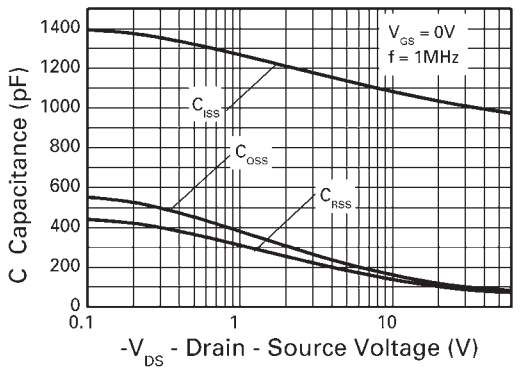


On-Resistance v Drain Current

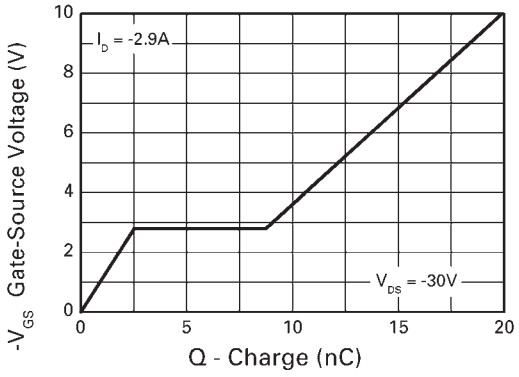


Source-Drain Diode Forward Voltage

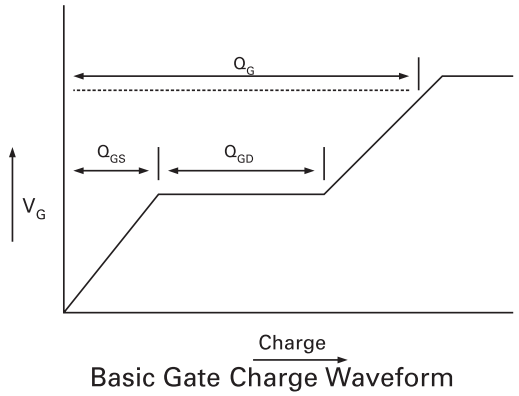
P-CHANNEL TYPICAL CHARACTERISTICS



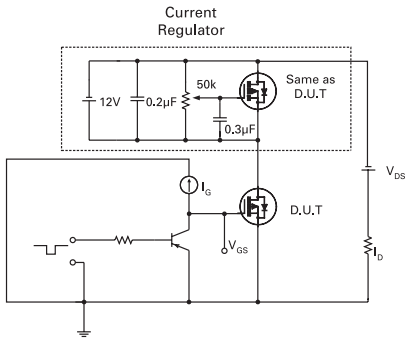
Capacitance v Drain-Source Voltage



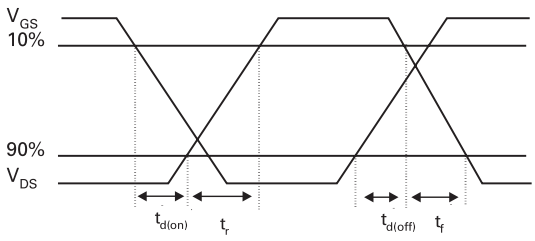
Gate-Source Voltage v Gate Charge



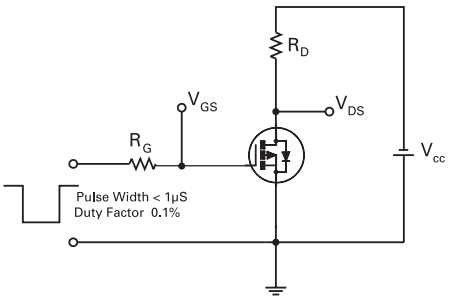
Basic Gate Charge Waveform



Gate Charge Test Circuit



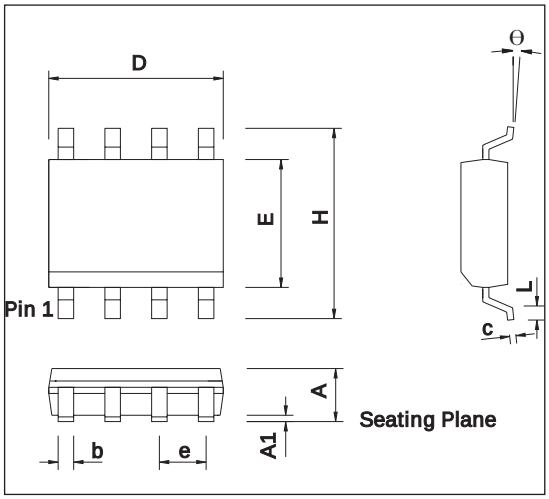
Switching Time Waveforms



Switching Time Test Circuit

ZXMC4559DN8

PACKAGE OUTLINE



CONTROLLING DIMENSIONS ARE IN INCHES
APPROX IN MILLIMETRES

PACKAGE DIMENSIONS

DIM	INCHES		MILLIMETRES	
	MIN	MAX	MIN	MAX
A	0.053	0.069	1.35	1.75
A1	0.004	0.010	0.10	0.25
D	0.189	0.197	4.80	5.00
H	0.228	0.244	5.80	6.20
E	0.150	0.157	3.80	4.00
L	0.016	0.050	0.40	1.27
e	0.050 BSC		1.27 BSC	
b	0.013	0.020	0.33	0.51
c	0.008	0.010	0.19	0.25
θ	0°	8°	0°	8°
h	0.010	0.020	0.25	0.50

Europe

Zetex GmbH
Streitfeldstraße 19
D-81673 München
Germany

Telefon: (49) 89 45 49 49 0
Fax: (49) 89 45 49 49 49
europe.sales@zetex.com

Americas

Zetex Inc
700 Veterans Memorial Hwy
Hauppauge, NY 11788
USA

Telephone: (1) 631 360 2222
Fax: (1) 631 360 8222
usa.sales@zetex.com

Asia Pacific

Zetex (Asia) Ltd
3701-04 Metroplaza Tower 1
Hing Fong Road, Kwai Fong
Hong Kong

Telephone: (852) 26100 611
Fax: (852) 24250 494
asia.sales@zetex.com

Corporate Headquarters

Zetex Semiconductors plc
Zetex Technology Park
Chadderton, Oldham, OL9 9LL
United Kingdom

Telephone (44) 161 622 4444
Fax: (44) 161 622 4446
hq@zetex.com

These offices are supported by agents and distributors in major countries world-wide.

For the latest product information, log on to www.zetex.com

ISSUE 5 - MAY 2005