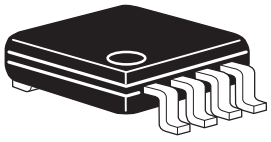
30V DUAL N AND P-CHANNEL ENHANCEMENT MODE MOSFET

SUMMARY

N-CHANNEL: $V_{(BR)DSS}$=30V; $R_{DS(ON)}$=0.135Ω; I_D=2.3A
P-CHANNEL: $V_{(BR)DSS}$=-30V; $R_{DS(ON)}$=0.185Ω; I_D=-2.0A



MSOP8

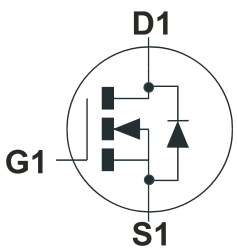
DESCRIPTION

This new generation of high density 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.

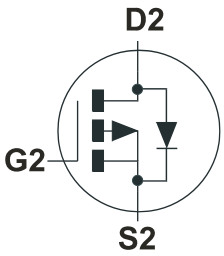
FEATURES

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

N-channel



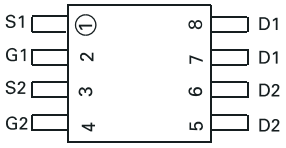
P-channel



APPLICATIONS

- DC - DC converters
- Power management functions
- Disconnect switches
- Motor control

Pin-out



Top view

ORDERING INFORMATION

DEVICE	REEL SIZE (inches)	TAPE WIDTH (mm)	QUANTITY PER REEL
ZXMD63C03XTA	7	12 embossed	1,000
ZXMD63C03XTC	13	12 embossed	4,000

DEVICE MARKING

ZXM63C03

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	N-CHANNEL	P-CHANNEL	UNIT
Drain-Source Voltage	V_{DSS}	30	-30	V
Gate- Source Voltage	V_{GS}	±20		V
Continuous Drain Current (V_{GS}=4.5V; T_A=25°C)(b)(d) (V_{GS}=4.5V; T_A=70°C)(b)(d)	I_D	 2.3 1.8	 -2.0 -1.6	 A A
Pulsed Drain Current (c)(d)	I_{DM}	14	-9.6	A
Continuous Source Current (Body Diode)(b)(d)	I_S	1.5	-1.4	A
Pulsed Source Current (Body Diode)(c)(d)	I_{SM}	14	-9.6	A
Power Dissipation at T_A=25°C (a)(d) Linear Derating Factor	P_D	0.87 6.9		W mW/°C
Power Dissipation at T_A=25°C (a)(e) Linear Derating Factor	P_D	1.04 8.3		W mW/°C
Power Dissipation at T_A=25°C (b)(d) Linear Derating Factor	P_D	1.25 10		W 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)	$R_{\theta JA}$	143	°C/W
Junction to Ambient (b)(d)	$R_{\theta JA}$	100	°C/W
Junction to Ambient (a)(e)	$R_{\theta JA}$	120	°C/W

NOTES:

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

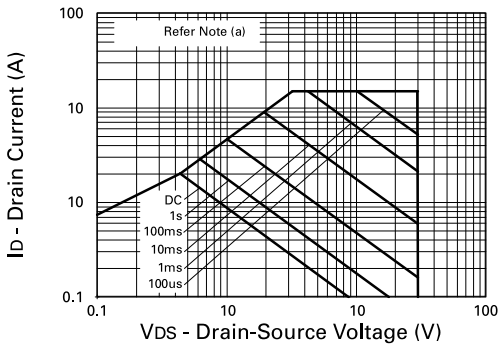
(b) For a device surface mounted on FR4 PCB measured at t≤10 secs.

(c) Repetitive rating - pulse width limited by maximum junction temperature. Refer to Transient Thermal Impedance graph.

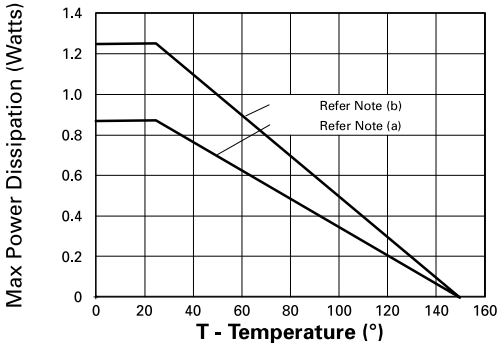
(d) For device with one active die.

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

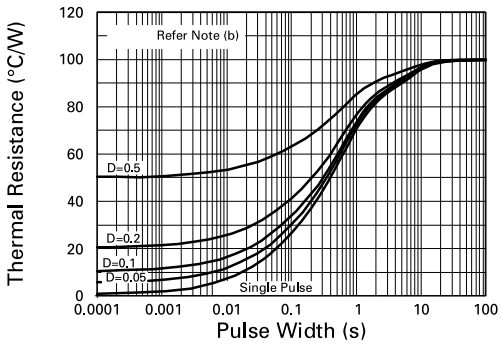
N-CHANNEL CHARACTERISTICS



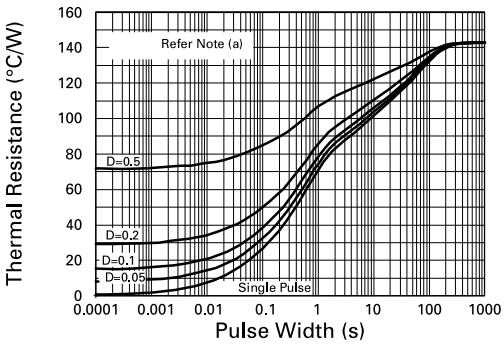
Safe Operating Area



Derating Curve

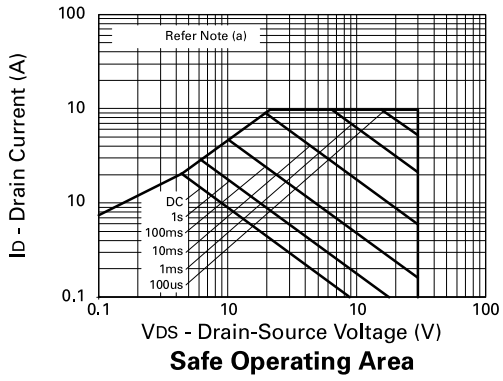


Transient Thermal Impedance

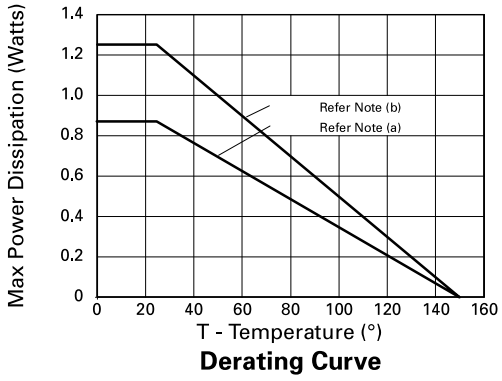


Transient Thermal Impedance

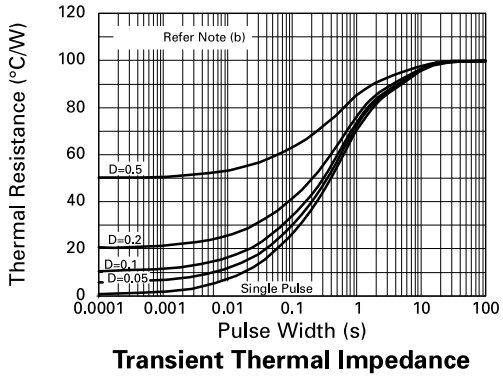
P-CHANNEL CHARACTERISTICS



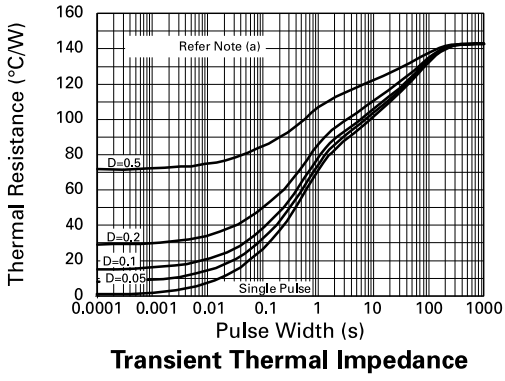
Safe Operating Area



Derating Curve



Transient Thermal Impedance



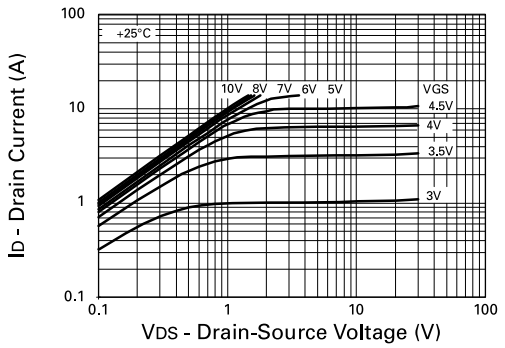
Transient Thermal Impedance

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

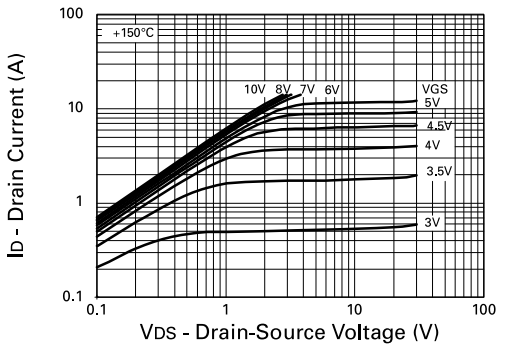
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
STATIC						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	30			V	I_D=250µA, V_{GS}=0V
Zero Gate Voltage Drain Current	I_{DSS}			1	µA	V_{DS}=30V, V_{GS}=0V
Gate-Body Leakage	I_{GSS}			100	nA	V_{GS}=± 20V, V_{DS}=0V
Gate-Source Threshold Voltage	$V_{GS(th)}$	1.0			V	I_D=250µA, V_{DS}= V_{GS}
Static Drain-Source On-State Resistance (1)	$R_{DS(on)}$			0.135 0.200	Ω Ω	V_{GS}=10V, I_D=1.7A V_{GS}=4.5V, I_D=0.85A
Forward Transconductance (3)	g_{fs}	1.9			S	V_{DS}=10V,I_D=0.85A
DYNAMIC (3)						
Input Capacitance	C_{iss}		290		pF	V_{DS}=25 V, V_{GS}=0V, f=1MHz
Output Capacitance	C_{oss}		70		pF	
Reverse Transfer Capacitance	C_{rss}		20		pF	
SWITCHING(2) (3)						
Turn-On Delay Time	$t_{d(on)}$		2.5		ns	V_{DD} =15V, I_D=1.7A R_G=6.1Ω, R_D=8.7Ω (Refer to test circuit)
Rise Time	t_r		4.1		ns	
Turn-Off Delay Time	$t_{d(off)}$		9.6		ns	
Fall Time	t_f		4.4		ns	
Total Gate Charge	Q_g			8	nC	V_{DS}=24V,V_{GS}=10V, I_D=1.7A (Refer to test circuit)
Gate-Source Charge	Q_{gs}			1.2	nC	
Gate Drain Charge	Q_{gd}			2	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}		16.9		ns	T_j=25°C, I_F=1.7A, di/dt= 100A/µs
Reverse Recovery Charge(3)	Q_{rr}		9.5		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.

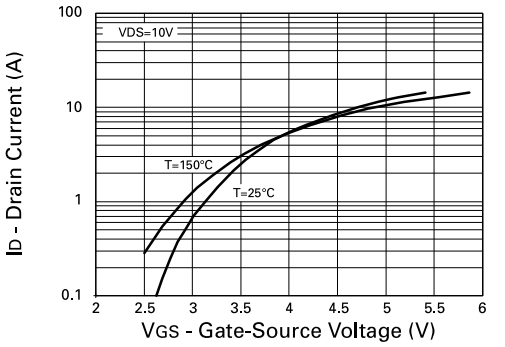
N-CHANNEL TYPICAL CHARACTERISTICS



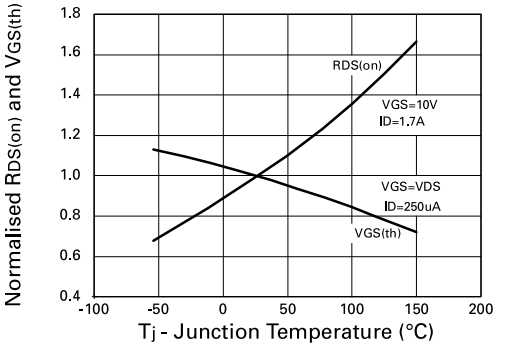
Output Characteristics



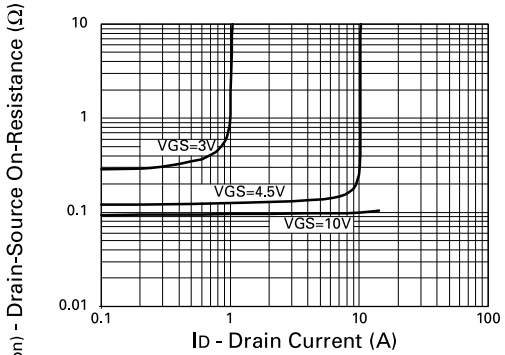
Output Characteristics



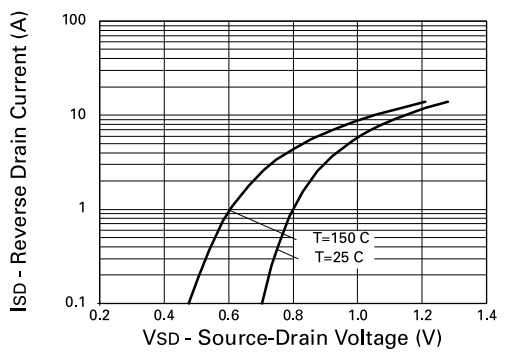
Typical Transfer Characteristics



Normalised RDS(on) and VGS(th) v Temperature

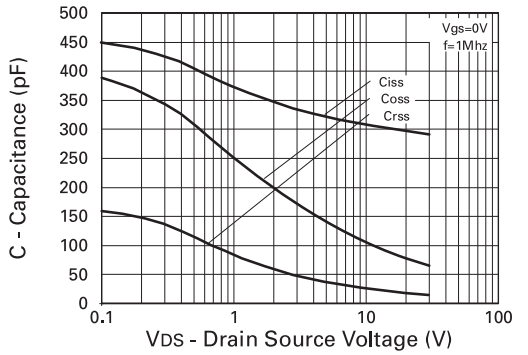


On-Resistance v Drain Current

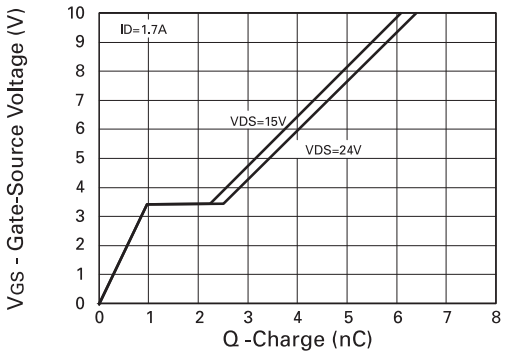


Source-Drain Diode Forward Voltage

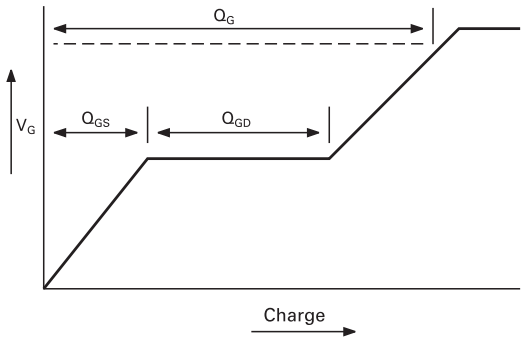
N-CHANNEL CHARACTERISTICS



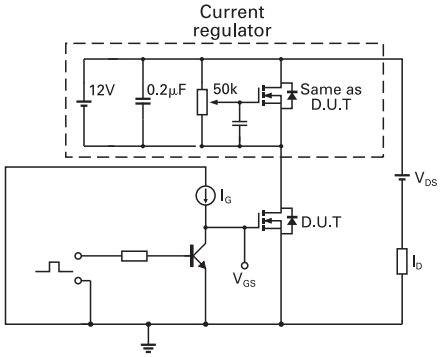
Capacitance v Drain-Source Voltage



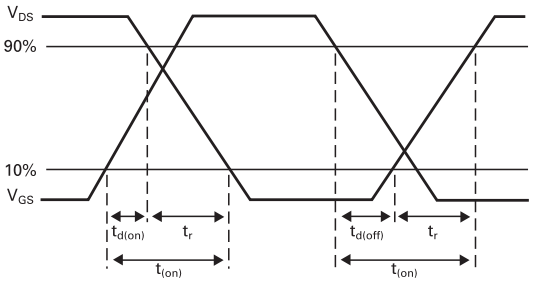
Gate-Source Voltage v Gate Charge



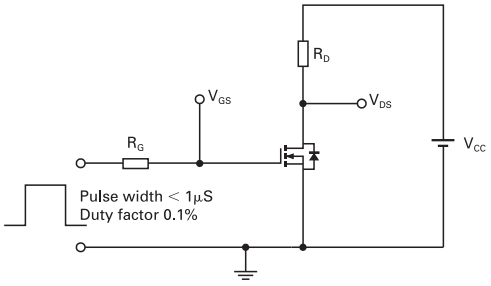
Basic gate charge waveform



Gate charge test circuit



Switching time waveforms



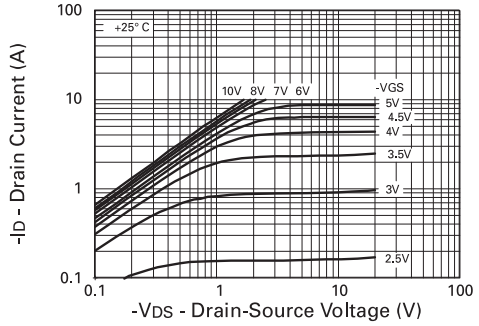
Switching time test circuit

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

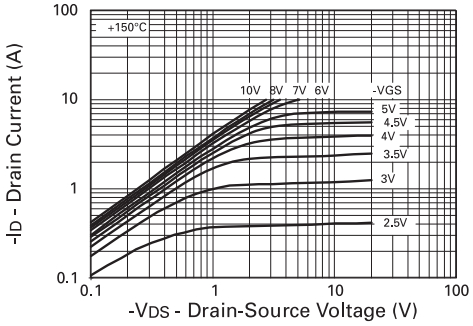
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
STATIC						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	-30			V	I_D=-250μA, V_{GS}=0V
Zero Gate Voltage Drain Current	I_{DSS}			-1	μA	V_{DS}=-30V, V_{GS}=0V
Gate-Body Leakage	I_{GSS}			±100	nA	V_{GS}=±20V, V_{DS}=0V
Gate-Source Threshold Voltage	$V_{GS(th)}$	-1.0			V	I_D=-250μA, V_{DS}=V_{GS}
Static Drain-Source On-State Resistance (1)	$R_{DS(on)}$			0.185 0.27	Ω Ω	V_{GS}=-10V, I_D=-1.2A V_{GS}=-4.5V, I_D=-0.6A
Forward Transconductance (3)	g_{fs}	0.92			S	V_{DS}=-10V,I_D=-0.6A
DYNAMIC (3)						
Input Capacitance	C_{iss}		270		pF	V_{DS}=-25 V, V_{GS}=0V, f=1MHz
Output Capacitance	C_{oss}		80		pF	
Reverse Transfer Capacitance	C_{rss}		30		pF	
SWITCHING(2) (3)						
Turn-On Delay Time	$t_{d(on)}$		2.6		ns	V_{DD} =-15V, I_D=-1.2A R_G=6.2Ω, R_D=6.2Ω (Refer to test circuit)
Rise Time	t_r		4.8		ns	
Turn-Off Delay Time	$t_{d(off)}$		13.1		ns	
Fall Time	t_f		9.3		ns	
Total Gate Charge	Q_g			7	nC	V_{DS}=-24V,V_{GS}=-10V, I_D=-1.2A (Refer to test circuit)
Gate-Source Charge	Q_{gs}			1.2	nC	
Gate Drain Charge	Q_{gd}			2	nC	
SOURCE-DRAIN DIODE						
Diode Forward Voltage (1)	V_{SD}			-0.95	V	T_j=25°C, I_S=-1.2A, V_{GS}=0V
Reverse Recovery Time (3)	t_{rr}		21.4		ns	T_j=25°C, I_F=-1.2A, di/dt= 100A/μs
Reverse Recovery Charge(3)	Q_{rr}		15.7		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.

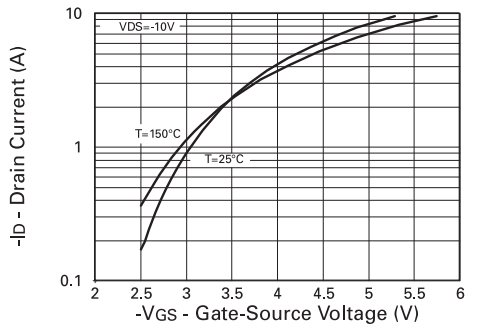
P-CHANNEL CHARACTERISTICS



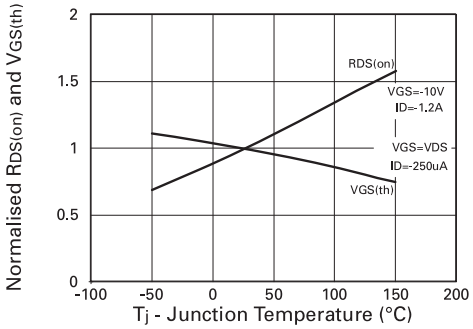
Output Characteristics



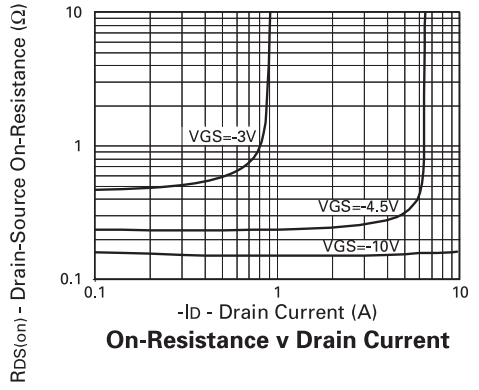
Output Characteristics



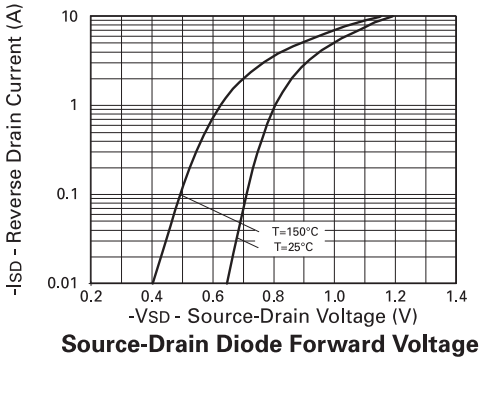
Typical Transfer Characteristics



Normalised $R_{DS(on)}$ and $V_{GS(th)}$ v Temperature

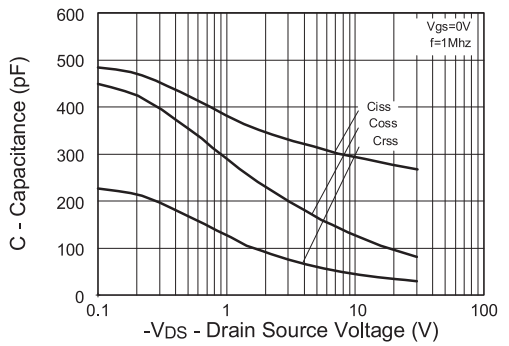


On-Resistance v Drain Current

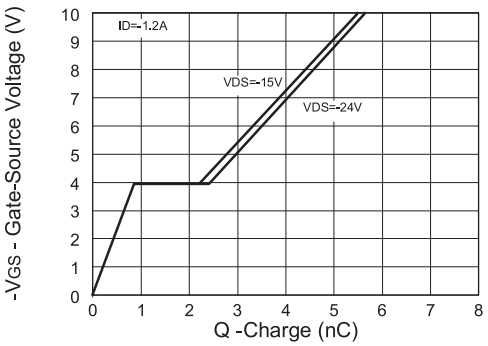


Source-Drain Diode Forward Voltage

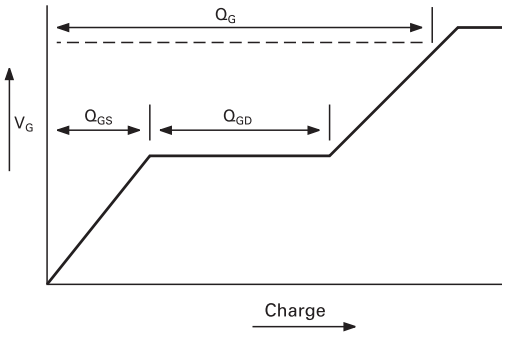
P-CHANNEL TYPICAL CHARACTERISTICS



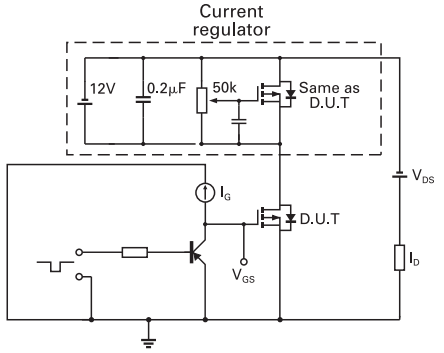
Capacitance v Drain-Source Voltage



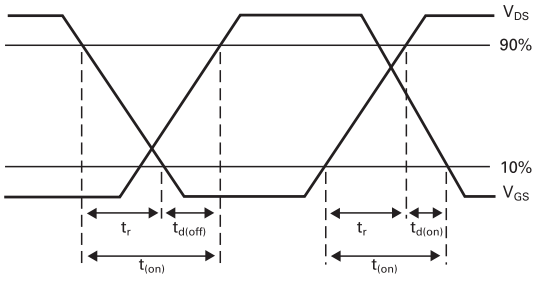
Gate-Source Voltage v Gate Charge



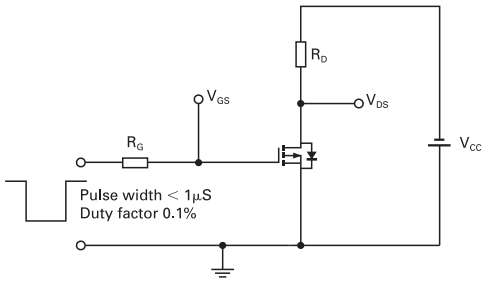
Basic gate charge waveform



Gate charge test circuit



Switching time waveforms



Switching time test circuit

A

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or

2. support or sustain life and whose failure to perform when properly used in accordance with instructions

for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

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Zetex Semiconductors does not warrant or accept any liability whatsoever in respect of any parts purchased through unauthorized sales channels.

ESD (Electrostatic discharge)

Semiconductor devices are susceptible to damage by ESD. Suitable precautions should be taken when handling and transporting devices. The possible damage to devices depends on the circumstances of the handling and transporting, and the nature of the device. The extent of damage can vary from immediate functional or parametric malfunction to degradation of function or performance in use over time. Devices suspected of being affected should be replaced.

Green compliance

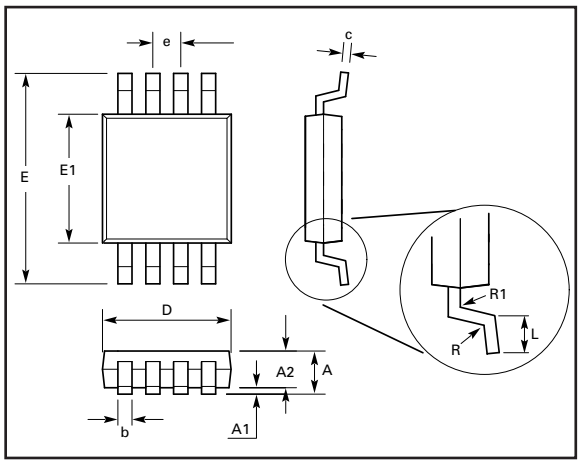
Zetex Semiconductors is committed to environmental excellence in all aspects of its operations which includes meeting or exceeding regulatory requirements with respect to the use of hazardous substances. Numerous successful programs have been implemented to reduce the use of hazardous substances and/or emissions.

All Zetex components are compliant with the RoHS directive, and through this it is supporting its customers in their compliance with WEEE and ELV directives.

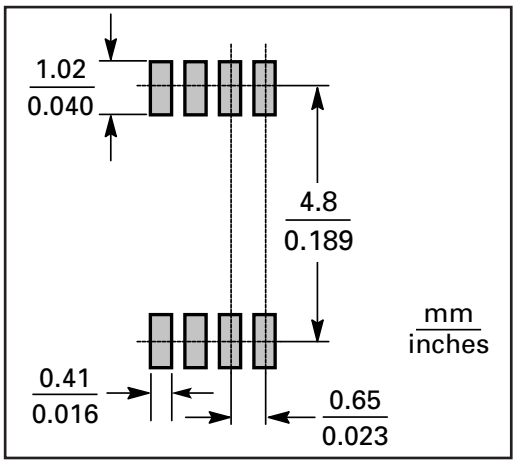
Product status key:

"Preview"Future device intended for production at some point. Samples may be available
"Active"Product status recommended for new designs
"Last time buy (LTB)"Device will be discontinued and last time buy period and delivery is in effect
"Not recommended for new designs"Device is still in production to support existing designs and production
"Obsolete"Production has been discontinued
Datasheet status key:
"Draft version"This term denotes a very early datasheet version and contains highly provisional information, which may change in any manner without notice.
"Provisional version"This term denotes a pre-release datasheet. It provides a clear indication of anticipated performance. However, changes to the test conditions and specifications may occur, at any time and without notice.
"Issue"This term denotes an issued datasheet containing finalized specifications. However, changes to specifications may occur, at any time and without notice.

PACKAGE DIMENSIONS



PAD LAYOUT DETAILS



DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	-	1.10	-	0.0433
A1	0.05	0.15	0.002	0.006
A2	0.75	0.95	0.0295	0.0374
b	0.25	0.40	0.010	0.0157
c	0.13	0.23	0.005	0.009
D	2.90	3.10	0.114	0.122
E	4.90 BSC		0.193 BSC	
E1	2.90	3.10	0.114	0.122
e	0.65 BSC		0.025 BSC	
L	0.40	0.70	0.0157	0.0192
R	0.07	-	0.0027	-
R1	0.07	-	0.0027	-

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