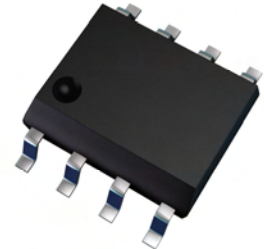


ZXMHC3A01N8

30V SO8 Complementary enhancement mode MOSFET H-Bridge

Summary

Device	$V_{(BR)DSS}$	Q_G	$R_{DS(on)}$	I_D $T_A = 25^\circ\text{C}$
N-CH	30V	3.9nC	125m Ω @ $V_{GS} = 10\text{V}$	2.7A
			180m Ω @ $V_{GS} = 4.5\text{V}$	2.2A
P-CH	-30V	5.2nC	210m Ω @ $V_{GS} = -10\text{V}$	-2.1A
			330m Ω @ $V_{GS} = -4.5\text{V}$	-1.6A



Description

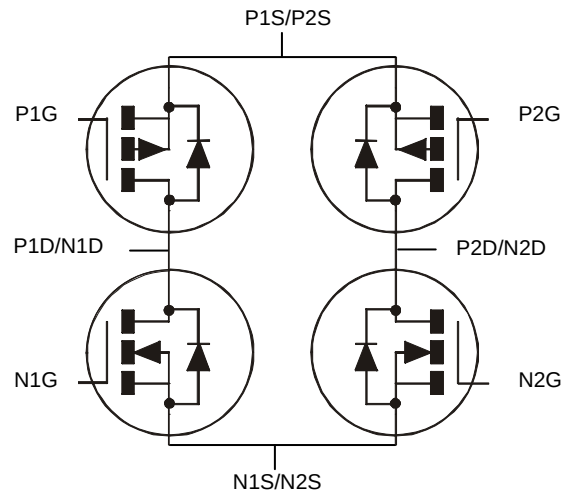
This new generation complementary MOSFET H-Bridge features low on-resistance achievable with low gate drive.

Features

- 2 x N + 2 x P channels in a SOIC package

Applications

- DC Motor control
- DC-AC Inverters

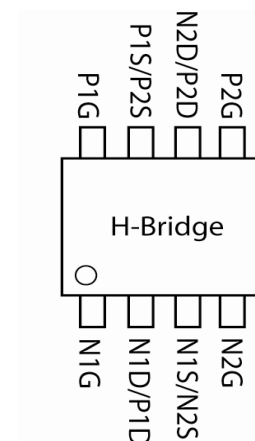


Ordering information

Device	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXMHC3A01N8TC	13	12	2,500

Device marking

ZXMHC
3A01



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 @ $V_{GS} = 10V$; $T_A = 25^\circ C$ ^(b) @ $V_{GS} = 10V$; $T_A = 70^\circ C$ ^(b) @ $V_{GS} = 10V$; $T_A = 25^\circ C$ ^(a) @ $V_{GS} = 10V$; $T_L = 25^\circ C$ ^(f)	I_D	2.72 2.18 2.17 2.21	-2.06 -1.65 -1.64 -1.67	A
Pulsed Drain current @ $V_{GS} = 10V$; $T_A = 25^\circ C$ ^(c)	I_{DM}	11.7	-8.84	A
Continuous Source current (Body diode) at $T_A = 25^\circ C$ ^(b)	I_S	1.60	-1.60	A
Pulsed Source current (Body diode) at $T_A = 25^\circ C$ ^(c)	I_{SM}	11.7	-8.84	A
Power dissipation at $T_A = 25^\circ C$ ^(a) Linear derating factor	P_D	0.87 6.94		W mW/ $^\circ C$
Power dissipation at $T_A = 25^\circ C$ ^(b) Linear derating factor	P_D	1.36 10.9		W mW/ $^\circ C$
Power dissipation at $T_L = 25^\circ C$ ^(f) Linear derating factor	P_D	0.90 7.19		W mW/ $^\circ C$
Operating and storage temperature range	T_j, T_{stg}	-55 to 150		$^\circ C$

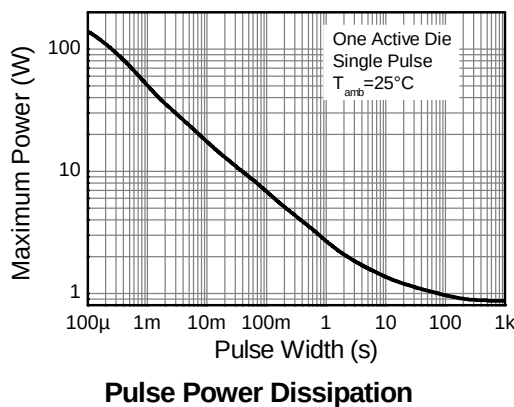
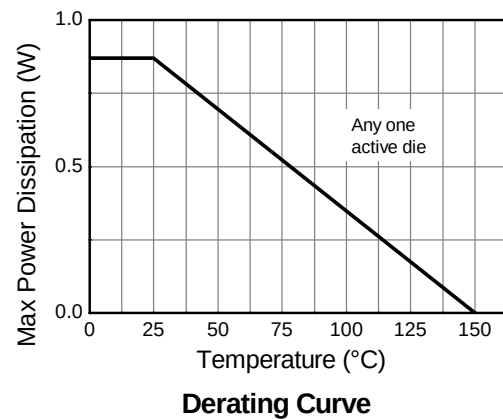
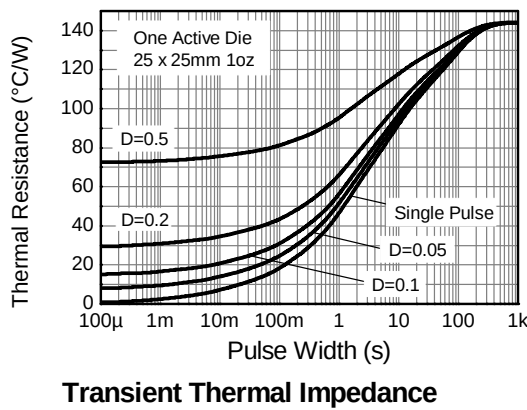
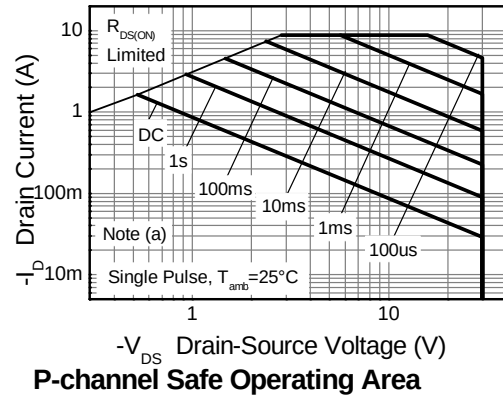
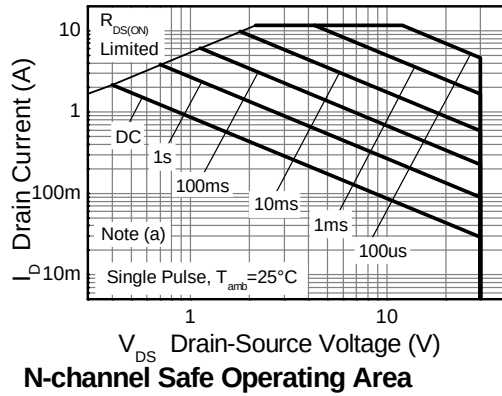
Thermal resistance

Parameter	Symbol	Value	Unit
Junction to ambient ^(a)	$R_{\theta JA}$	144	$^\circ C/W$
Junction to ambient ^(b)	$R_{\theta JA}$	92	$^\circ C/W$
Junction to ambient ^(d)	$R_{\theta JA}$	106	$^\circ C/W$
Junction to ambient ^(e)	$R_{\theta JA}$	254	$^\circ C/W$
Junction to lead ^(f)	$R_{\theta JL}$	139	$^\circ C/W$

NOTES:

- For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions with the heat-sink split into two equal areas (one for each drain connection); the device is measured when operating in a steady-state condition with one active die.
- Same as note (a), except the device is measured at $t \leq 10$ sec.
- Same as note (a), except the device is pulsed with $D = 0.02$ and pulse width 300 μs . The pulse current is limited by the maximum junction temperature.
- 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); the device is measured when operating in a steady-state condition with one active die.
- For a device surface mounted on minimum copper 1.6mm FR4 PCB, in still air conditions; the device is measured when operating in a steady-state condition with one active die.
- Thermal resistance from junction to solder-point (at the end of the drain lead); the device is operating in a steady-state condition with one active die.

Thermal characteristics



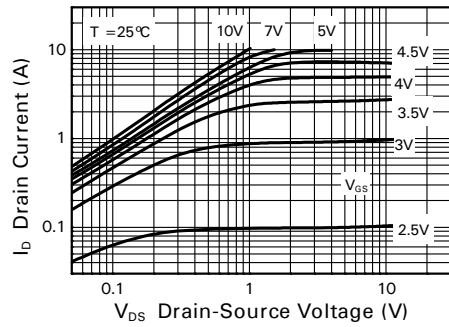
N-channel electrical characteristics (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

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}			0.5	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 ^(a)	R _{DS(on)}			0.125 0.180	Ω	V _{GS} = 10V, I _D = 2.5A V _{GS} = 4.5V, I _D = 2.0A
Forward Transconductance ^{(a) (c)}	g _{fs}		3.5		S	V _{DS} = 15V, I _D = 2.5A
Dynamic						
Capacitance ^(c)						
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 ^{(b) (c)}						
Turn-on-delay time	t _{d(on)}		1.7		ns	V _{DD} = 15V, V _{GS} = 10V I _D = 2.5A R _G ≅ 6.0Ω,
Rise time	t _r		2.3		ns	
Turn-off delay time	t _{d(off)}		6.6		ns	
Fall time	t _f		2.9		ns	
Gate charge ^(c)						
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 ^(a)	V _{SD}			0.95	V	I _S = 1.25A, V _{GS} = 0V
Reverse recovery time ^(c)	t _{rr}		17.7		ns	I _S = 2.5A, di/dt= 100A/μs
Reverse recovery charge ^(c)	Q _{rr}		13.0		nC	

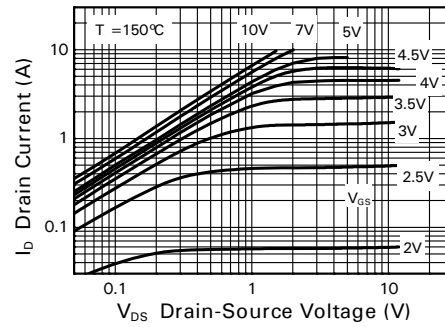
NOTES:

- (a) Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.
(b) Switching characteristics are independent of operating junction temperature.
(c) For design aid only, not subject to production testing

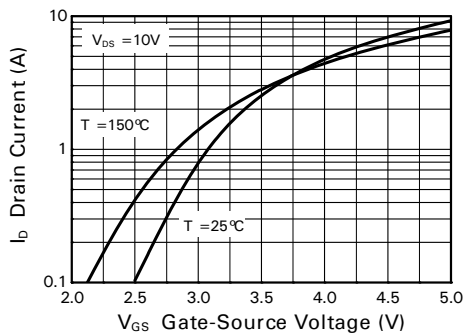
N-channel typical characteristics



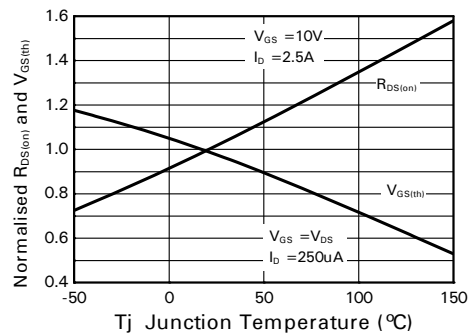
Output Characteristics



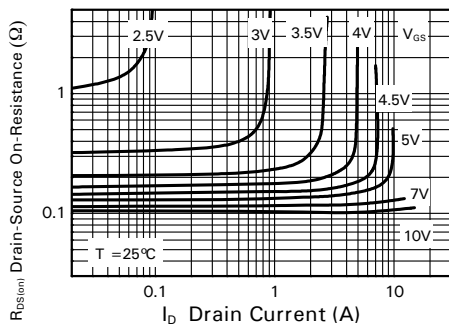
Output Characteristics



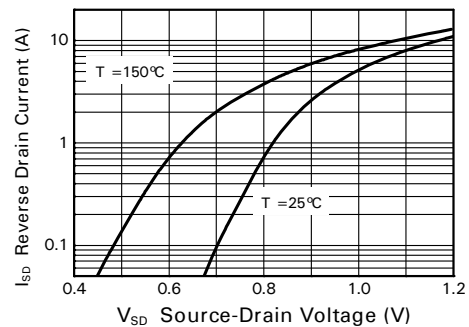
Typical Transfer Characteristics



Normalised Curves v Temperature

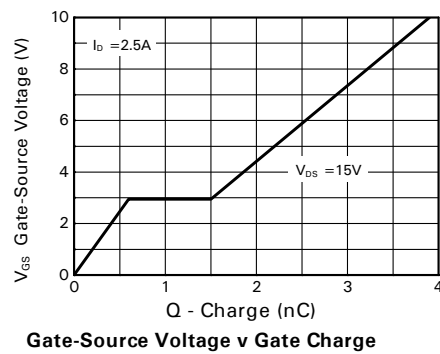
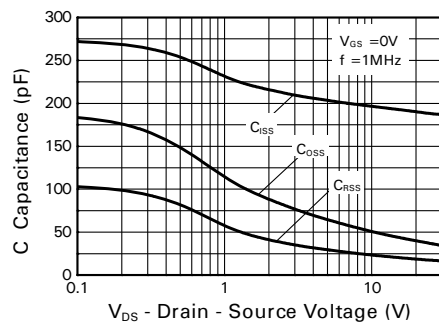


On-Resistance v Drain Current

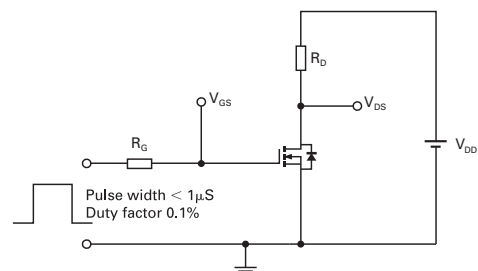
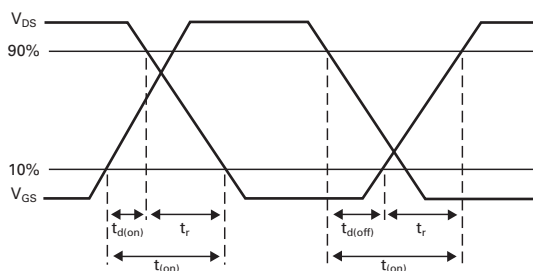
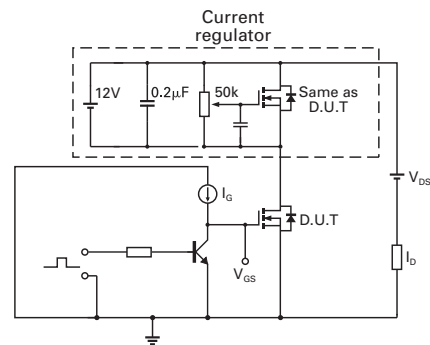
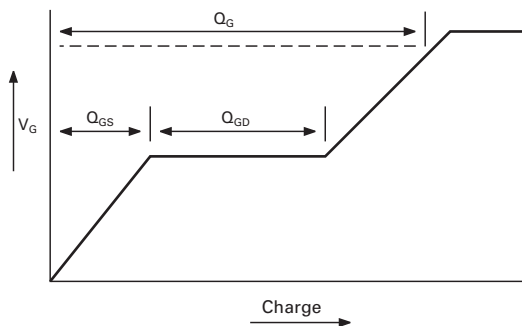


Source-Drain Diode Forward Voltage

N-channel typical characteristics –continued



Test circuits



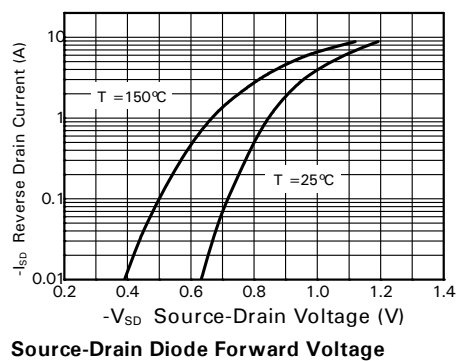
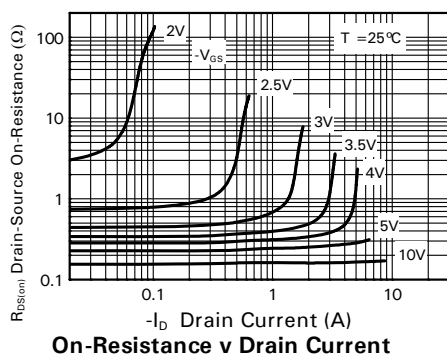
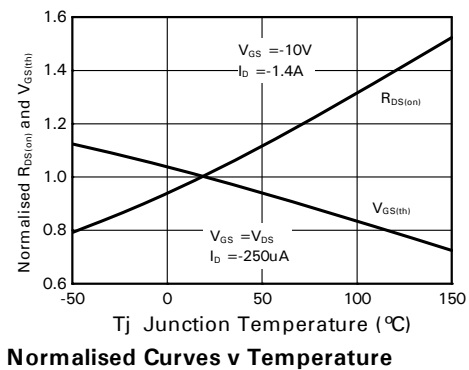
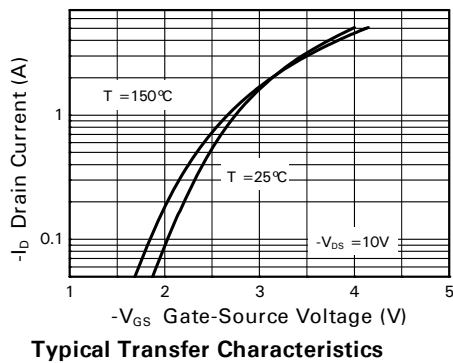
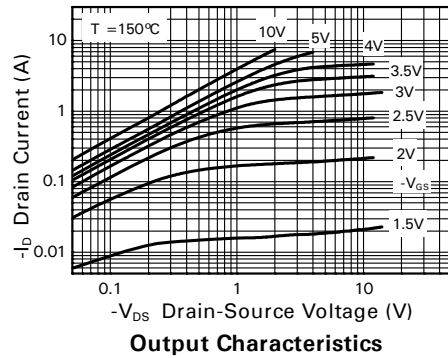
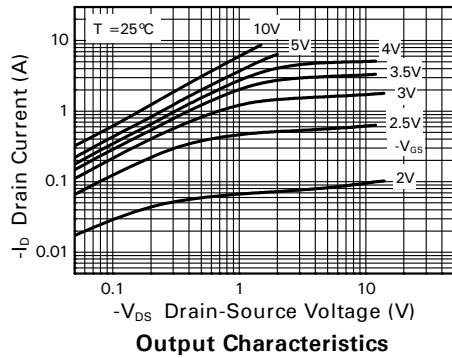
P-channel electrical characteristics (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

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}			-0.5	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 ^(a)	R _{DS(on)}			0.210 0.330	Ω	V _{GS} = -10V, I _D = -1.4A V _{GS} = -4.5V, I _D = -1.1A
Forward Transconductance ^{(a) (c)}	g _{fs}		2.5		S	V _{DS} = -15V, I _D = -1.4A
Dynamic						
Capacitance ^(c)						
Input capacitance	C _{iss}		204		pF	V _{DS} = -15V, V _{GS} = 0V f= 1MHz
Output capacitance	C _{oss}		39.8		pF	
Reverse transfer capacitance	C _{rss}		25.8		pF	
Switching ^{(b) (c)}						
Turn-on-delay time	t _{d(on)}		1.2		ns	V _{DD} = -15V, V _{GS} = -10V I _D = -1.0A R _G ≅ 6.0Ω
Rise time	t _r		2.3		ns	
Turn-off delay time	t _{d(off)}		12.1		ns	
Fall time	t _f		7.5		ns	
Gate charge ^(c)						
Total Gate charge	Q _g		5.2		nC	V _{DS} = -15V, V _{GS} = -10V I _D = -1.4A
Gate-Source charge	Q _{gs}		0.7		nC	
Gate-Drain charge	Q _{gd}		0.9		nC	
Source–Drain diode						
Diode forward voltage ^(a)	V _{SD}		-0.85	-0.95	V	I _S = -1.5A, V _{GS} = 0V
Reverse recovery time ^(c)	t _{rr}		19		ns	I _S = -0.95A, di/dt= 100A/μs
Reverse recovery charge ^(c)	Q _{rr}		15		nC	

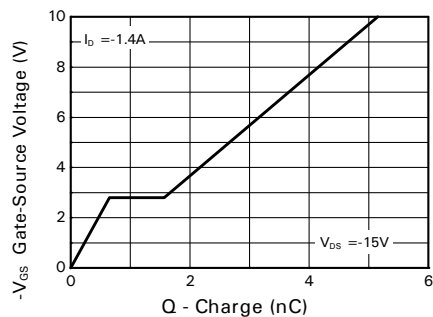
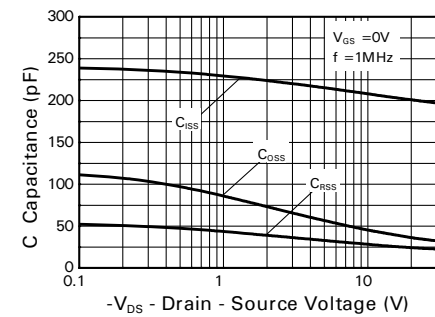
NOTES:

- (a) Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.
 (b) Switching characteristics are independent of operating junction temperature.
 (c) For design aid only, not subject to production testing

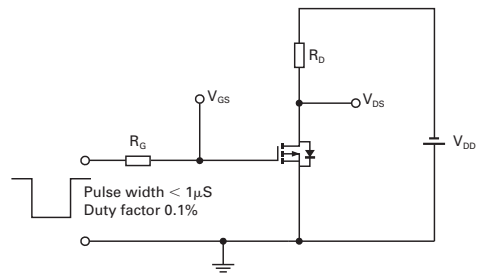
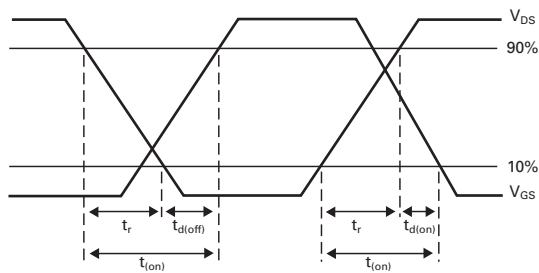
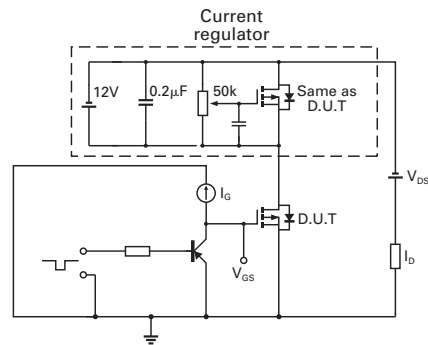
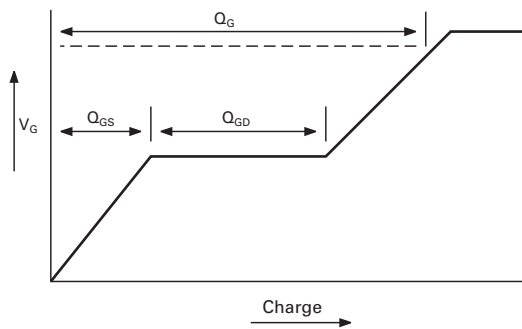
P-channel typical characteristics



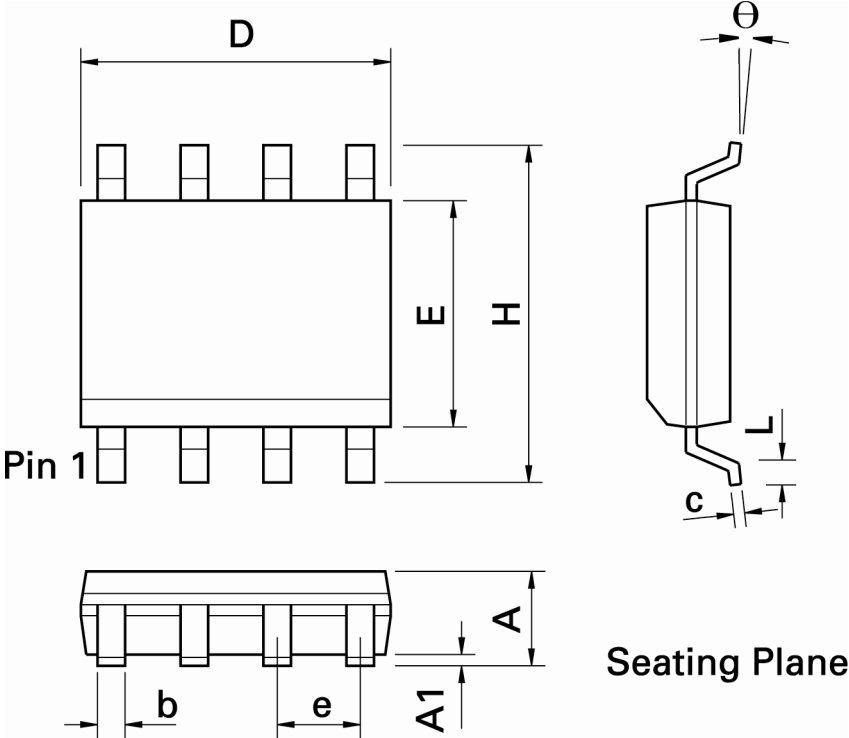
P-channel typical characteristics –continued



Test circuits



Packaging details - SO8



DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.053	0.069	1.35	1.75	e	0.050 BSC		1.27 BSC	
A1	0.004	0.010	0.10	0.25	b	0.013	0.020	0.33	0.51
D	0.189	0.197	4.80	5.00	c	0.008	0.010	0.19	0.25
H	0.228	0.244	5.80	6.20	θ	0°	8°	0°	8°
E	0.150	0.157	3.80	4.00	-	-	-	-	-
L	0.016	0.050	0.40	1.27	-	-	-	-	-

Note: Controlling dimensions are in inches. Approximate dimensions are provided in millimeters

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