优尚

YOUSHANG SEMICONDUCTOR

设计研发新型功率器件

各类小信号开关

中低压及高压大电流等场效应管

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企业微信二维码

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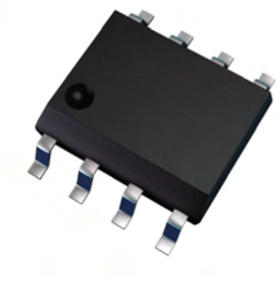
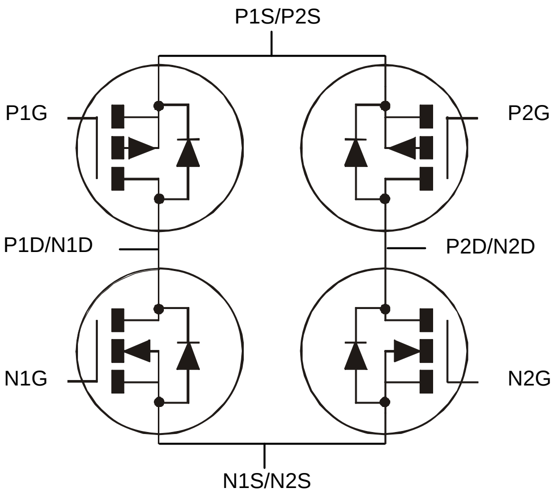
Summary

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



Description

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



Features

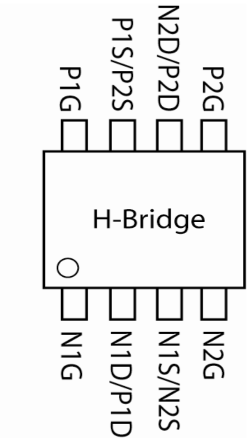
- 2 x N + 2 x P channels in a SOIC package

Applications

- DC Motor control
- DC-AC Inverters

Ordering information

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



Device marking

NK-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°C (b) @ V_{GS}= 10V; T_A=70°C (b) @ V_{GS}= 10V; T_A=25°C (a) @ V_{GS}= 10V; T_L=25°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°C (c)	I_{DM}	11.7	-8.84	A
Continuous Source current (Body diode) at T_A =25°C (b)	I_S	1.60	-1.60	A
Pulsed Source current (Body diode) at T_A =25°C (c)	I_{SM}	11.7	-8.84	A
Power dissipation at T_A =25°C (a) Linear derating factor	P_D	0.87 6.94		W mW/°C
Power dissipation at T_A =25°C (b) Linear derating factor	P_D	1.36 10.9		W mW/°C
Power dissipation at T_L =25°C (f) Linear derating factor	P_D	0.90 7.19		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)	$R_{\theta JA}$	144	°C/W
Junction to ambient (b)	$R_{\theta JA}$	92	°C/W
Junction to ambient (d)	$R_{\theta JA}$	106	°C/W
Junction to ambient (e)	$R_{\theta JA}$	254	°C/W
Junction to lead (f)	$R_{\theta JL}$	139	°C/W

NOTES:

(a) 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.

(b) Same as note (a), except the device is measured at t ≤ 10 sec.

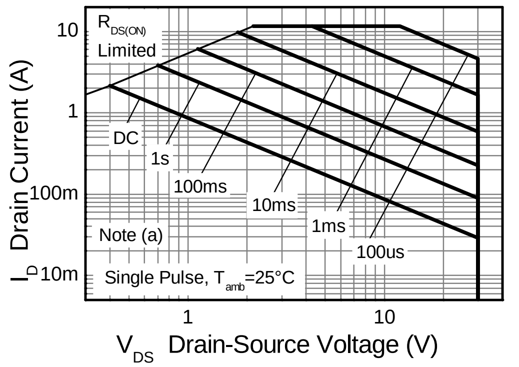
(c) Same as note (a), except the device is pulsed with D= 0.02 and pulse width 300 µs. The pulse current is limited by the maximum junction temperature.

(d) 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.

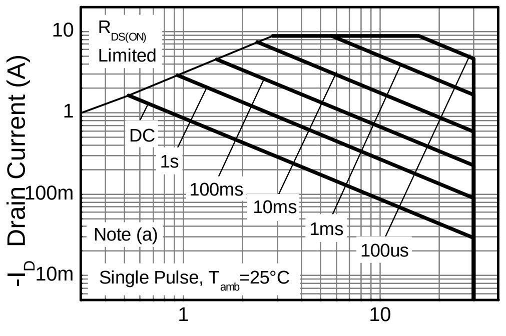
(e) For a device surface mounted on minimum copper 1.6mm FR4 PCB, in still air conditions; the device is measured when operating in a steady-state condition with one active die.

(f) 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.

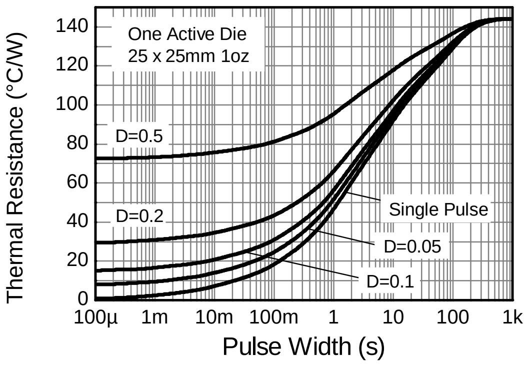
Thermal characteristics



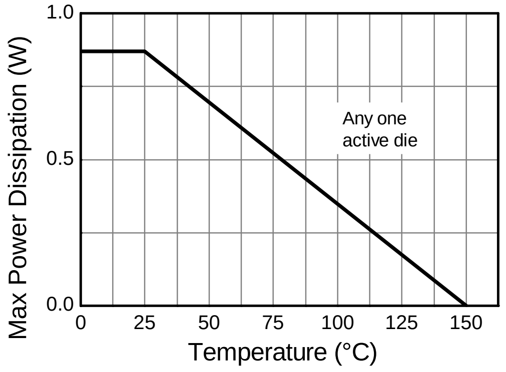
N-channel Safe Operating Area



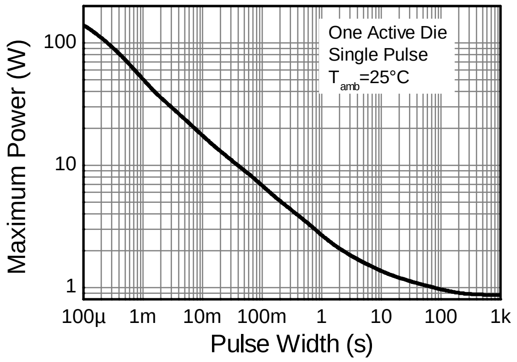
P-channel Safe Operating Area



Transient Thermal Impedance



Derating Curve



Pulse Power Dissipation

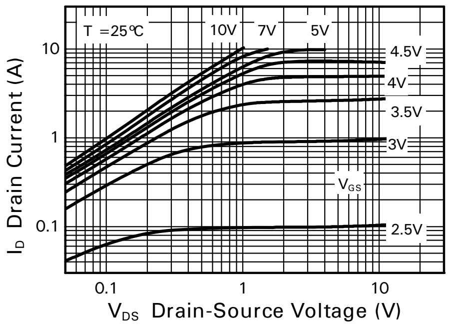
N-channel electrical characteristics (at T_{amb} = 25°C unless otherwise stated)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Static						
Drain-Source breakdown voltage	$V_{(BR)DSS}$	30			V	$I_D = 250\mu A$, $V_{GS} = 0V$
Zero Gate voltage Drain current	I_{DSS}			0.5	μA	$V_{DS} = 30V$, $V_{GS} = 0V$
Gate-Body leakage	I_{GSS}			±100	nA	$V_{GS} = \pm 20V$, $V_{DS} = 0V$
Gate-Source threshold voltage	$V_{GS(th)}$	1.0		3.0	V	$I_D = 250\mu A$, $V_{DS} = V_{GS}$
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	$V_{DD} = 15V$, $V_{GS} = 10V$ $I_D = 2.5A$ $R_G \cong 6.0\Omega$,
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	

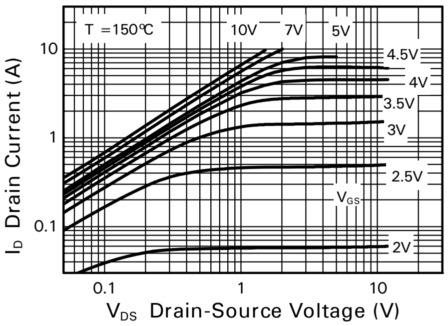
NOTES:

(a) Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%.
(b) Switching characteristics are independent of operating junction temperature.
(c) For design aid only, not subject to production testing

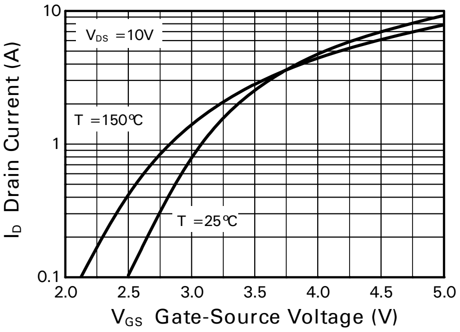
N-channel typical characteristics



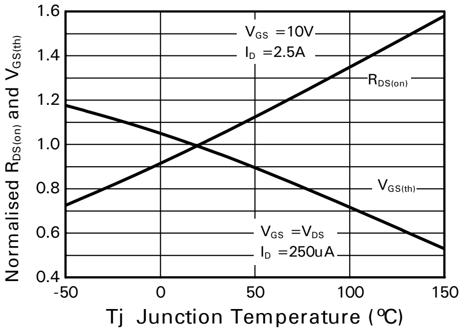
Output Characteristics



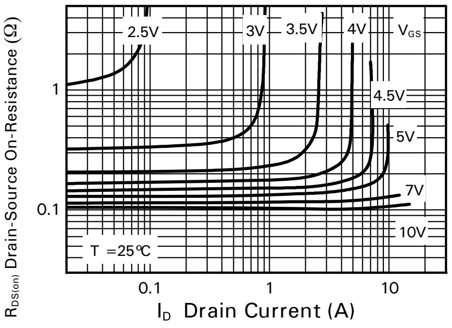
Output Characteristics



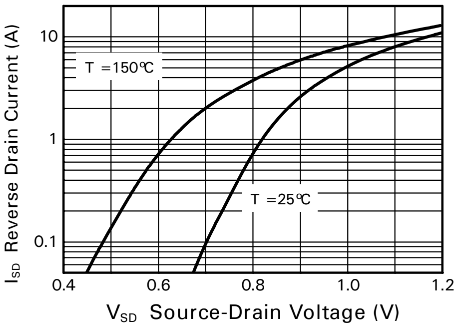
Typical Transfer Characteristics



Normalised Curves v Temperature

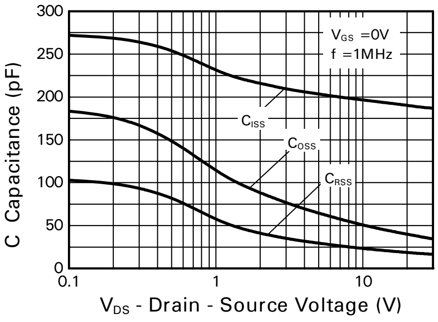


On-Resistance v Drain Current

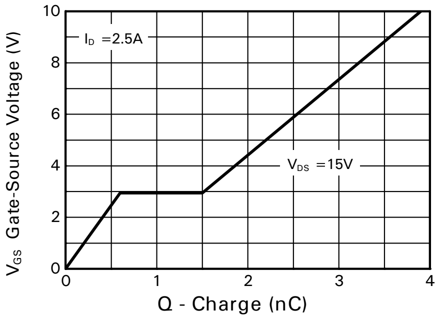


Source-Drain Diode Forward Voltage

N-channel typical characteristics –continued

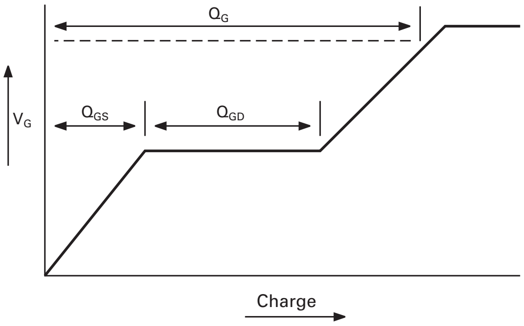


Capacitance v Drain-Source Voltage

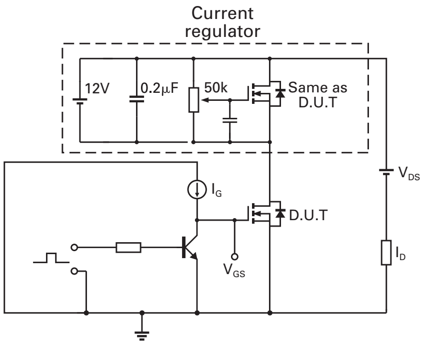


Gate-Source Voltage v Gate Charge

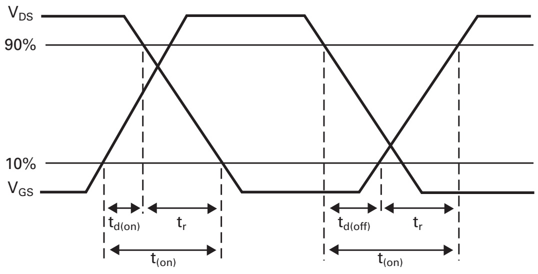
Test circuits



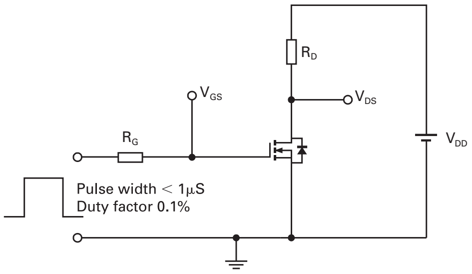
Basic gate charge waveform



Gate charge test circuit



Switching time waveforms



Switching time test circuit

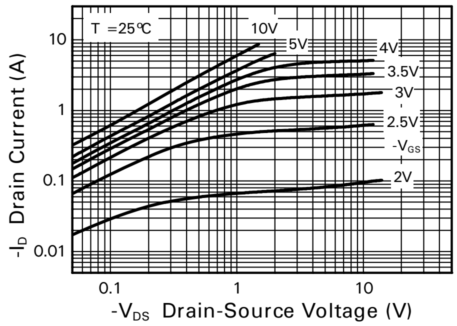
P-channel electrical characteristics (at T_{amb} = 25°C unless otherwise stated)

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}			-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 $R_G \cong 6.0\Omega$
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	

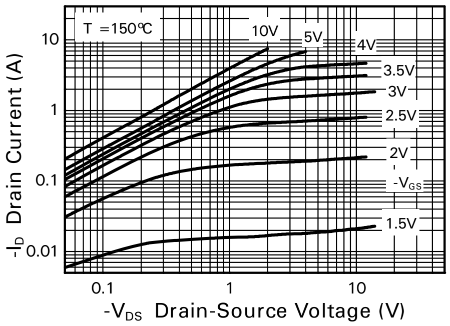
NOTES:

(a) Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%.
(b) Switching characteristics are independent of operating junction temperature.
(c) For design aid only, not subject to production testing

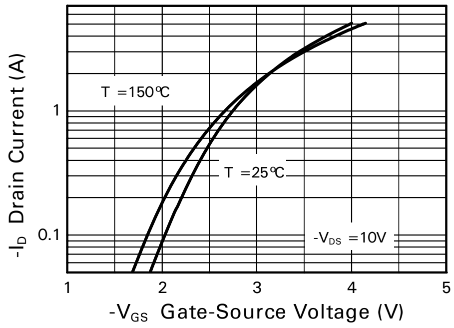
P-channel typical characteristics



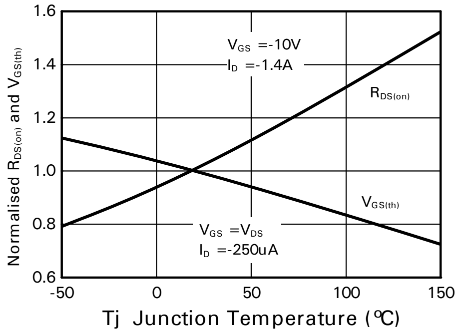
Output Characteristics



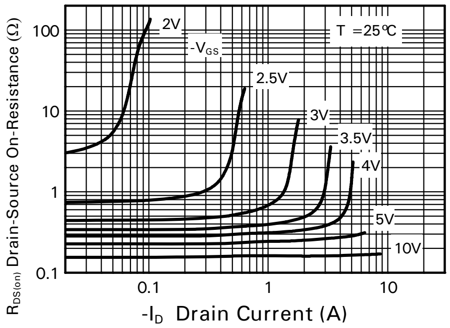
Output Characteristics



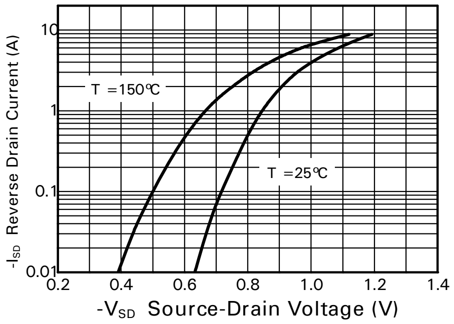
Typical Transfer Characteristics



Normalised Curves v Temperature

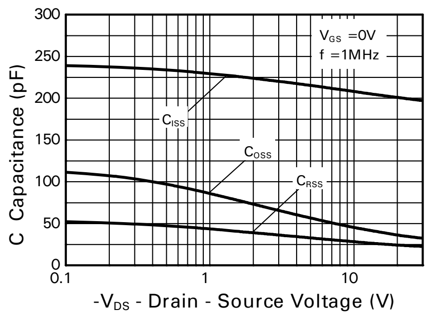


On-Resistance v Drain Current

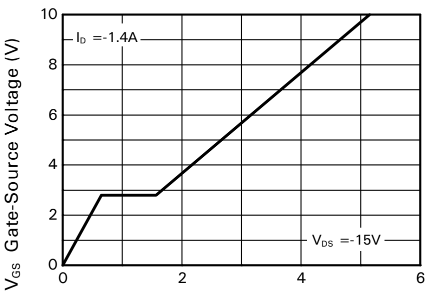


Source-Drain Diode Forward Voltage

P-channel typical characteristics –continued

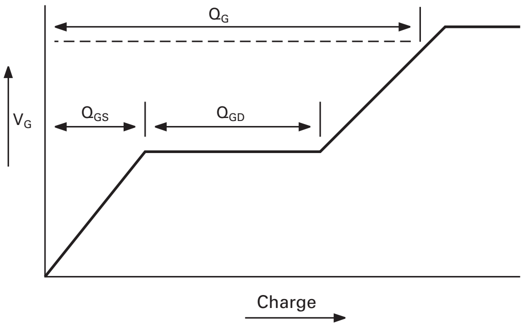


Capacitance v Drain-Source Voltage

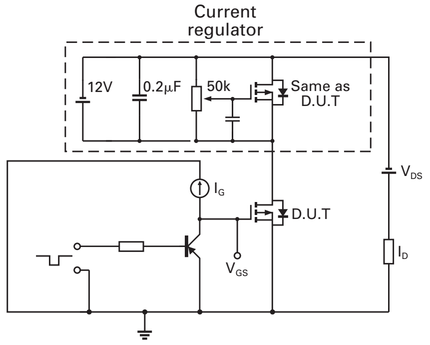


Gate-Source Voltage v Gate Charge

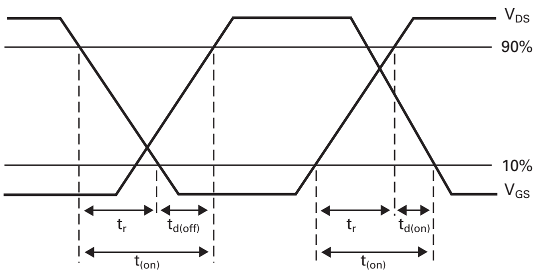
Test circuits



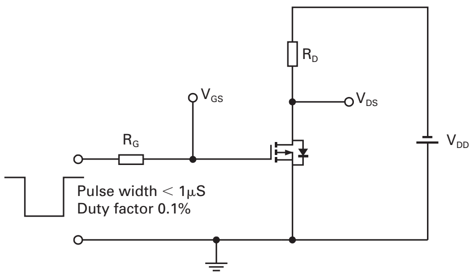
Basic gate charge waveform



Gate charge test circuit

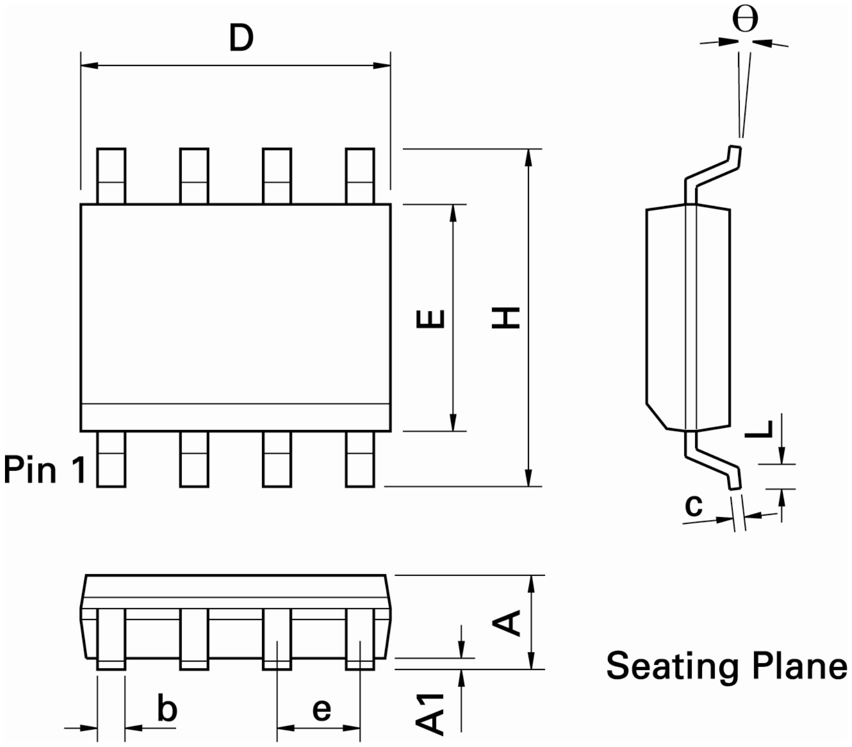


Switching time waveforms



Switching time test circuit

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