30V COMPLEMENTARY DUAL ENHANCEMENT MODE MOSFET

Product Summary

Device	$V_{(BR)DSS}$	$R_{DS(on)}$	I_D T_A = 25°C
Q1	30V	28mΩ @ V_{GS}= 10V	7.1A
		45mΩ @ V_{GS}= 4.5V	5.6A
Q2	-30V	25mΩ @ V_{GS}= -10V	-7.4A
		41mΩ @ V_{GS}= -4.5V	-5.7A

Features and Benefits

- Low on-resistance
- Fast switching speed
- "Green" Component and RoHS Compliant (Note 1)

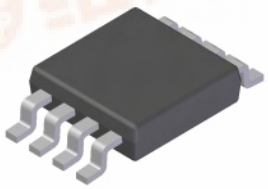
Mechanical Data

- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0 (Note 1)
- Moisture Sensitivity: Level 1 per J-STD-020D
- Terminals Connections: See Diagram
- Terminals: Finish - Matte Tin annealed over Copper lead frame. Solderable per MIL-STD-202, Method 208
- Weight: 0.074 grams (approximate)

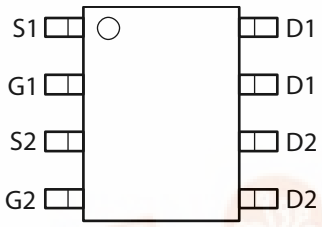
Description and Applications

This new generation complementary dual MOSFET features low on-resistance and fast switching, making it ideal for high efficiency power management applications.

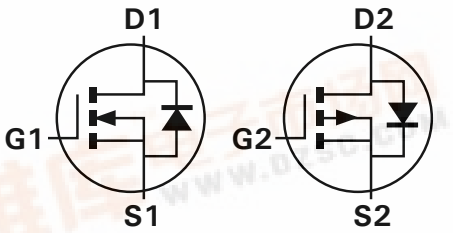
- Motor control
- Backlighting
- DC-DC Converters
- Power management functions



TOP VIEW



Top view



Q1 N-Channel Q2 P-Channel

Ordering Information (Note 1)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DMC3028LSD-13	C3028LD	13	12	2,500

Note: 1. Diodes, Inc. defines "Green" products as those which are Eu RoHS compliant and contain no halogens or antimony compounds; further information about Diodes Inc.'s "Green" Policy can be found on our website. For packaging details, go to our website

Marking Information

= Manufacturer's Marking
C3028LD = Product Type Marking Code
YYWW = Date Code Marking
YY = Year (ex: 09 = 2009)
WW = Week (01-52)

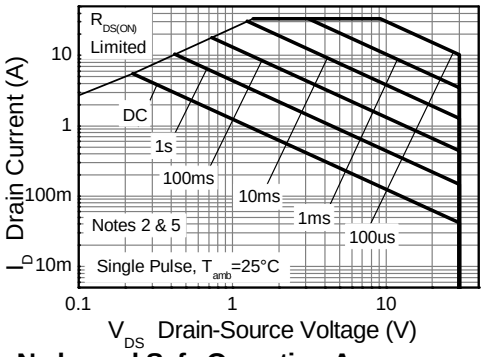
Maximum Ratings @T_A = 25°C unless otherwise specified

Characteristic			Symbol	N-Channel - Q1	P-Channel - Q2	Units
Drain-Source Voltage			V_{DSS}	30	-30	V
Gate-Source Voltage			V_{GSS}	±20	±20	V
Continuous Drain Current	V_{GS} = 10V	(Notes 3 & 5)	I_D	7.1	-7.4	A
		T_A = 70°C (Notes 3 & 5)		5.7	-5.9	
		(Notes 2 & 5)		5.5	-5.8	
		(Notes 2 & 6)		6.6	-6.8	
Pulsed Drain Current	V_{GS} = 10V	(Notes 4 & 5)	I_{DM}	34	-36	A
Continuous Source Current (Body diode)		(Notes 3 & 5)	I_S	3.5	-3.5	A
Pulsed Source Current (Body diode)		(Notes 4 & 5)	I_{SM}	34	-36	A

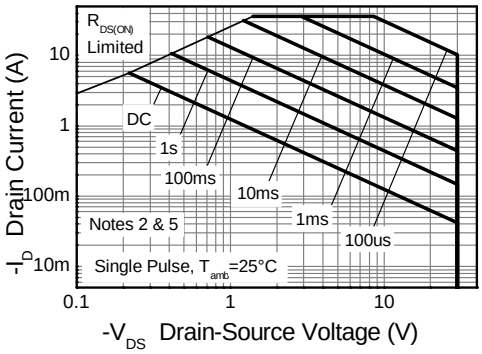
Thermal Characteristics @T_A = 25°C unless otherwise specified

Characteristic		Symbol	N-Channel - Q1	P-Channel - Q2	Unit
Power Dissipation Linear Derating Factor	(Notes 2 & 5)	P_D	1.3 10		W mW/°C
Power Dissipation Linear Derating Factor	(Notes 2 & 6)	P_D	1.8 14		W mW/°C
Power Dissipation Linear Derating Factor	(Notes 3 & 5)	P_D	2.1 17		W mW/°C
Thermal Resistance, Junction to Ambient	(Notes 2 & 5) (Notes 2 & 6) (Notes 3 & 5)	$R_{\theta JA}$	100 70 60		°C/W
Thermal Resistance, Junction to Lead	(Notes 5 & 7)	$R_{\theta JL}$	51	46	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150		°C

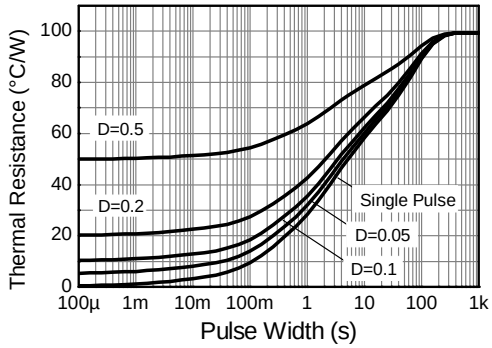
Notes:
2. For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
3. Same as note (2), except the device is measured at t ≤ 10 sec.
4. Same as note (2), except the device is pulsed with D= 0.02 and pulse width 300 µs. The pulse current is limited by the maximum junction temperature.
5. For a dual device with one active die.
6. For a device with two active die running at equal power.
7. Thermal resistance from junction to solder-point (at the end of the drain lead).



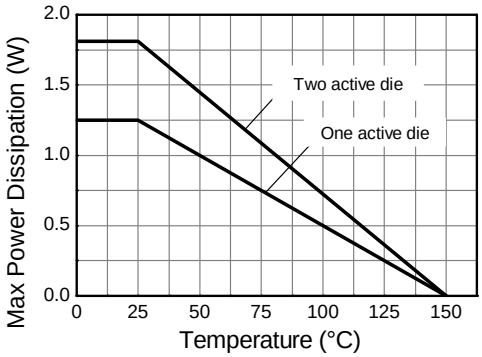
N-channel Safe Operating Area



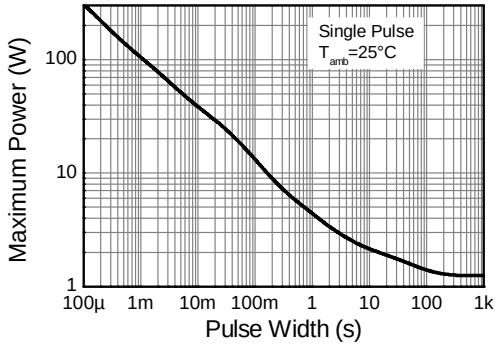
P-channel Safe Operating Area



Transient Thermal Impedance



Derating Curve



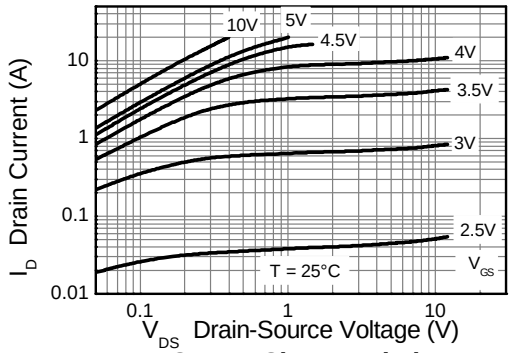
Pulse Power Dissipation

Electrical Characteristics – Q1 N-Channel @T_A = 25°C unless otherwise specified

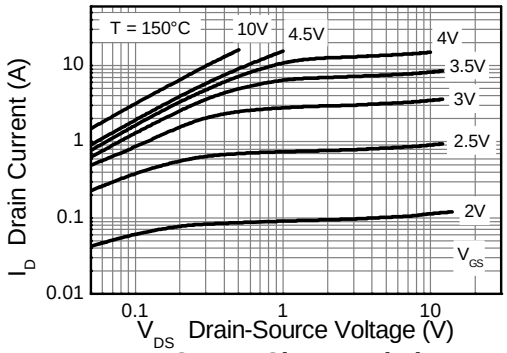
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	30	—	—	V	I_D = 250μA, V_{GS}= 0V
Zero Gate Voltage Drain Current	I_{DSS}	—	—	0.5	μA	V_{DS}= 30V, V_{GS}= 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS}= ±20V, V_{DS}= 0V
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(th)}$	1.0	—	3.0	V	I_D= 250μA, V_{DS}= V_{GS}
Static Drain-Source On-Resistance (Note 8)	$R_{DS\ (ON)}$	—	—	0.028	Ω	V_{GS}= 10V, I_D= 6.0A
				0.045		V_{GS}= 4.5V, I_D= 4.9A
Forward Transconductance (Notes 8 & 9)	g_{fs}	—	12	—	S	V_{DS}= 15V, I_D= 6.0A
Diode Forward Voltage (Note 8)	V_{SD}	—	0.68	1.2	V	I_S= 1.7A, V_{GS}= 0V
Reverse recovery time (Note 9)	t_{rr}		11.5	—	ns	I_S= 1.7A, di/dt= 100A/μs
Reverse recovery charge (Note 9)	Q_{rr}	—	4.4	—	nC	
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	472	—	pF	V_{DS}= 15V, V_{GS}= 0V f= 1MHz
Output Capacitance	C_{oss}	—	178	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	65	—	pF	
Total Gate Charge	Q_g	—	5.2	—	nC	V_{DS}= 15V, V_{GS}= 4.5V I_D= 6A
Total Gate Charge	Q_g	—	10.5	—	nC	V_{DS}= 15V, V_{GS}= 10V I_D= 6A
Gate-Source Charge	Q_{gs}	—	1.86	—	nC	
Gate-Drain Charge	Q_{gd}	—	2.3	—	nC	
Turn-On Delay Time (Note 10)	$t_{D(on)}$	—	2.5	—	ns	V_{DD}= 15V, V_{GS}= 10V I_D= 1A, $R_G \cong$ 6.0Ω
Turn-On Rise Time (Note 10)	t_r	—	3.1	—	ns	
Turn-Off Delay Time (Note 10)	$t_{D(off)}$	—	14	—	ns	
Turn-Off Fall Time (Note 10)	t_f	—	9.7	—	ns	

Notes:
8. Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%
9. For design aid only, not subject to production testing.
10. Switching characteristics are independent of operating junction temperatures.

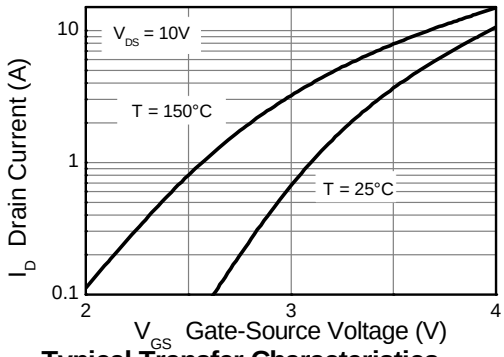
Q1 N-Channel



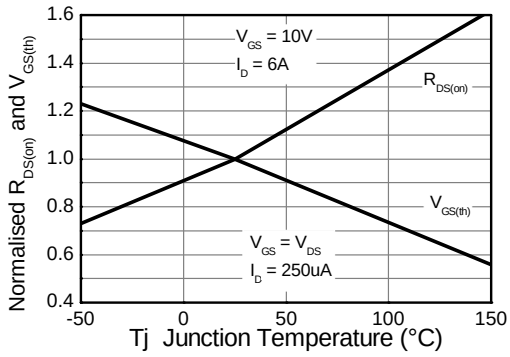
Output Characteristics



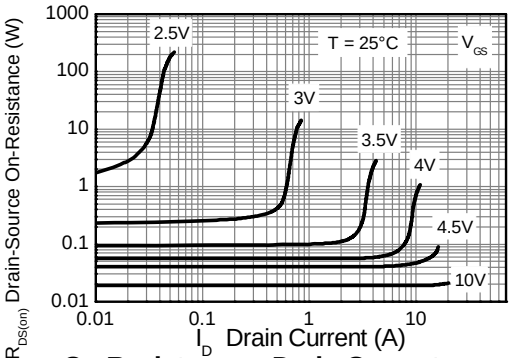
Output Characteristics



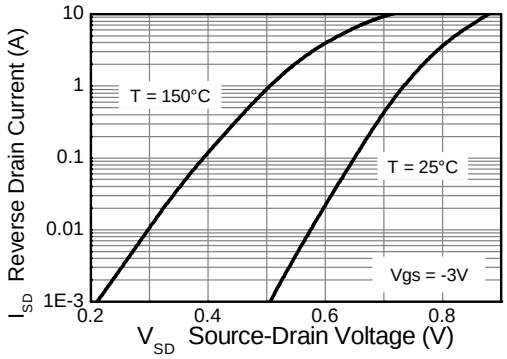
Typical Transfer Characteristics



Normalised Curves v Temperature

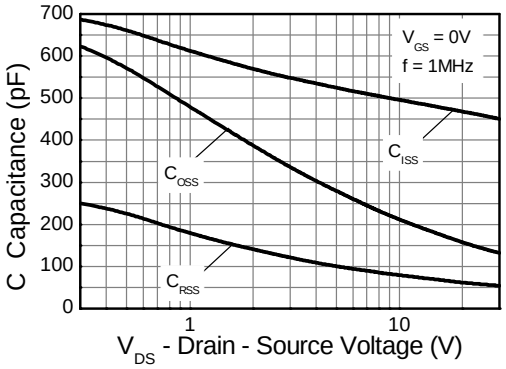


On-Resistance v Drain Current

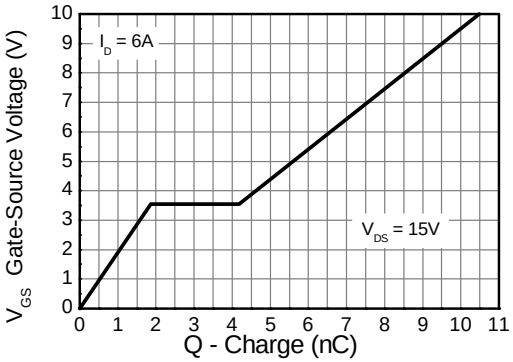


Source-Drain Diode Forward Voltage

Q1 N-Channel continued

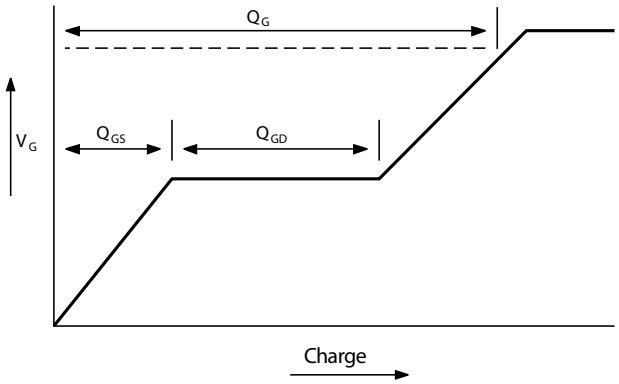


Capacitance v Drain-Source Voltage

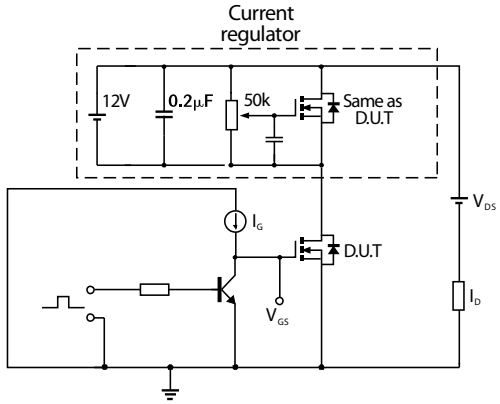


Gate-Source Voltage v Gate Charge

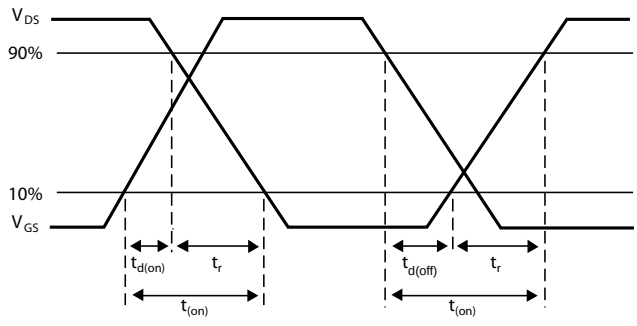
Test Circuits – Q1 N-Channel



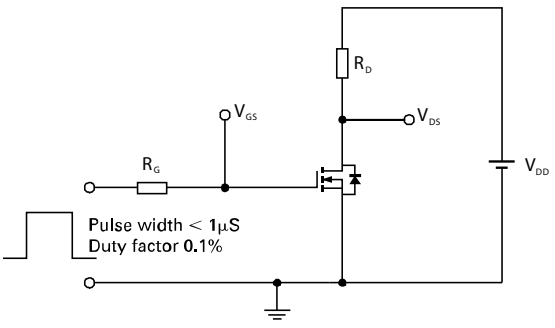
Basic gate charge waveform



Gate charge test circuit



Switching time waveforms



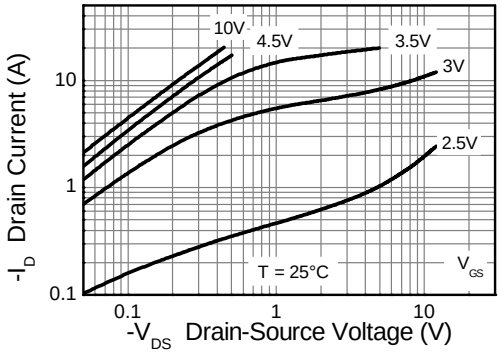
Switching time test circuit

Electrical Characteristics – Q2 P-Channel @T_A = 25°C unless otherwise specified

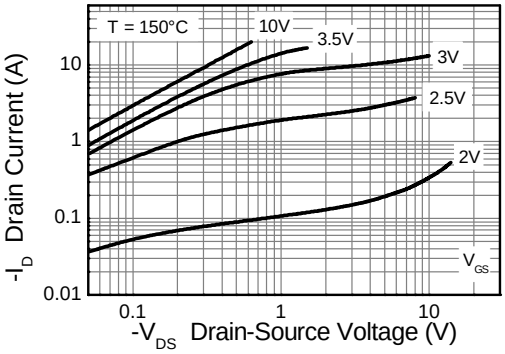
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	-30	—	—	V	I_D = -250μA, V_{GS}= 0V
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-0.5	μA	V_{DS}= -30V, V_{GS}= 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS}= ±20V, V_{DS}= 0V
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(th)}$	-1.0	—	-3.0	V	I_D= -250μA, V_{DS}= V_{GS}
Static Drain-Source On-Resistance (Note 8)	$R_{DS\ (ON)}$	—	—	0.025	Ω	V_{GS}= -10V, I_D= -7.1A
				0.041		V_{GS}= -4.5V, I_D= -5.5A
Forward Transconductance (Notes 8 & 9)	g_{fs}	—	18.6	—	S	V_{DS}= -15V, I_D= -7.1A
Diode Forward Voltage (Note 8)	V_{SD}	—	-0.80	-1.2	V	I_S= -1.7A, V_{GS}= 0V
Reverse recovery time (Note 9)	t_{rr}		16.2	—	ns	I_S= -2.2A, di/dt= 100A/μs
Reverse recovery charge (Note 9)	Q_{rr}	—	10	—	nC	
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	1678	—	pF	V_{DS}= -15V, V_{GS}= 0V f= 1MHz
Output Capacitance	C_{oss}	—	303	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	178	—	pF	
Total Gate Charge	Q_g	—	16.4	—	nC	V_{DS}= -15V, V_{GS}= -4.5V I_D= -7.1A
Total Gate Charge	Q_g	—	31.6	—	nC	V_{DS}= -15V, V_{GS}= -10V I_D= -7.1A
Gate-Source Charge	Q_{gs}	—	4.3	—	nC	
Gate-Drain Charge	Q_{gd}	—	6.2	—	nC	
Turn-On Delay Time (Note 10)	$t_{D(on)}$	—	3.5	—	ns	V_{DD}= -15V, V_{GS}= -10V I_D= -1A, $R_G \cong 6.0\Omega$
Turn-On Rise Time (Note 10)	t_r	—	4.9	—	ns	
Turn-Off Delay Time (Note 10)	$t_{D(off)}$	—	44	—	ns	
Turn-Off Fall Time (Note 10)	t_f	—	28	—	ns	

Notes:
8. Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%
9. For design aid only, not subject to production testing.
10. Switching characteristics are independent of operating junction temperatures.

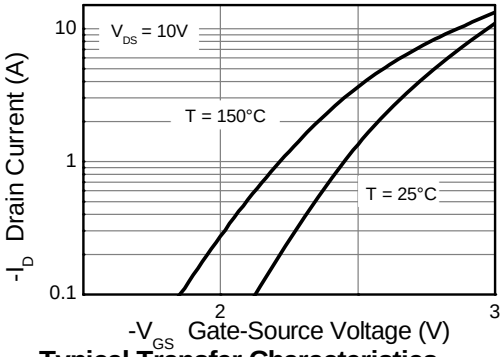
Q2 P-Channel



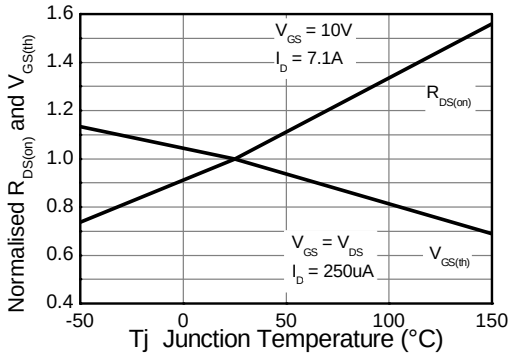
Output Characteristics



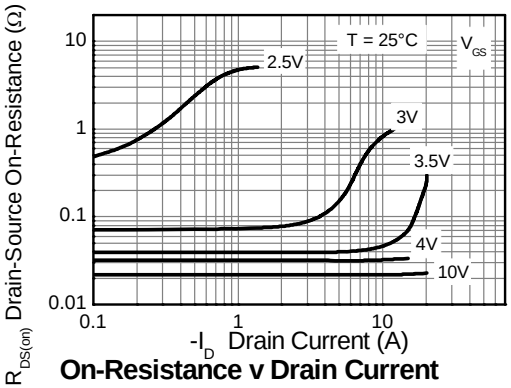
Output Characteristics



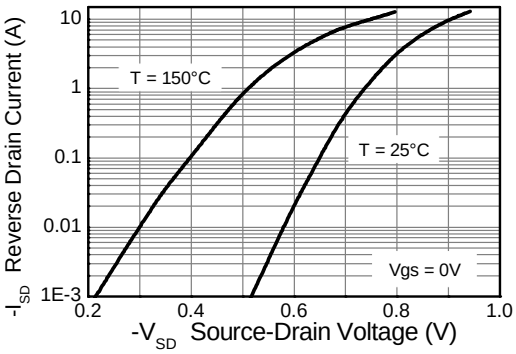
Typical Transfer Characteristics



Normalised Curves v Temperature

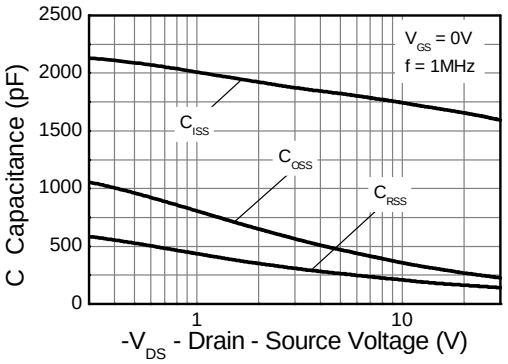


On-Resistance v Drain Current

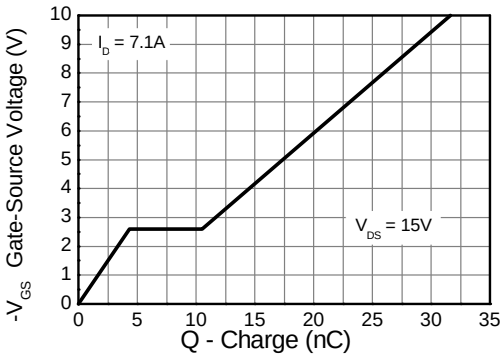


Source-Drain Diode Forward Voltage

Q2 P-Channel continued

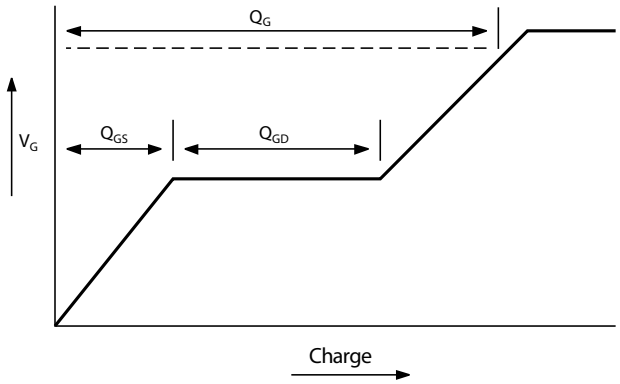


Capacitance v Drain-Source Voltage

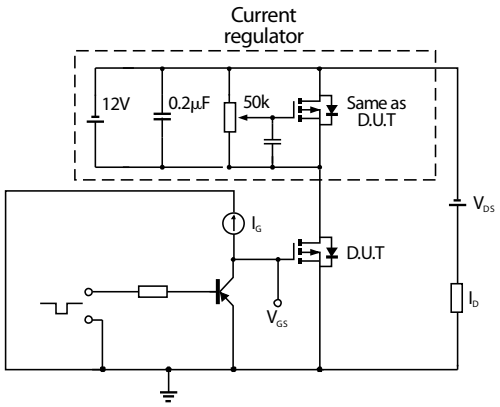


Gate-Source Voltage v Gate Charge

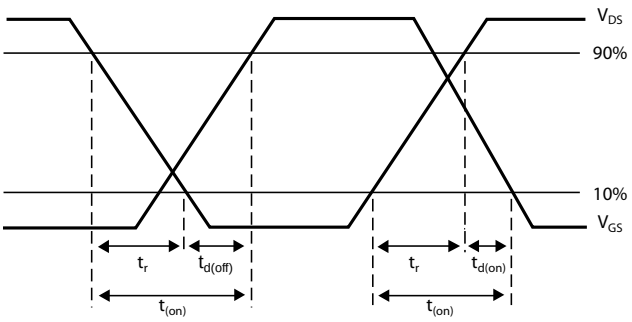
Test Circuits – Q2 P-Channel



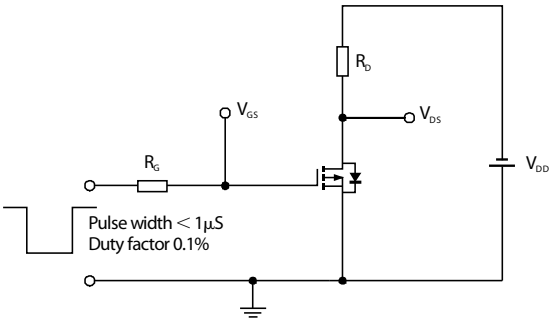
Basic gate charge waveform



Gate charge test circuit

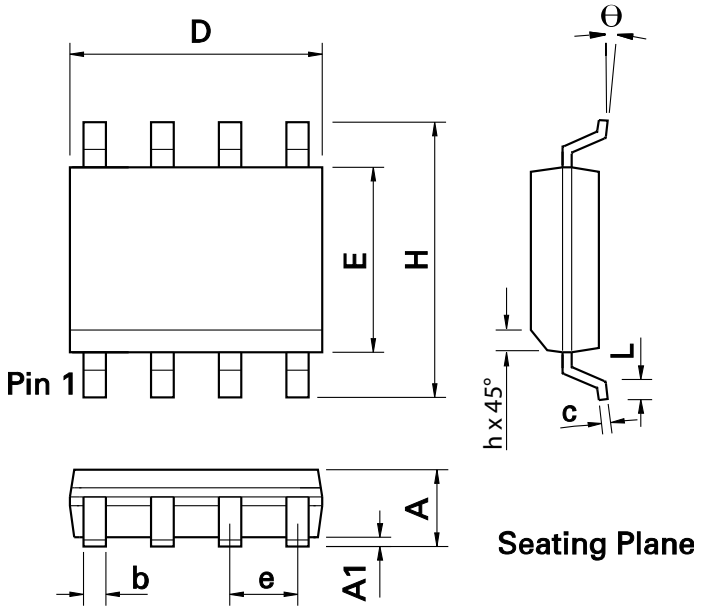


Switching time waveforms



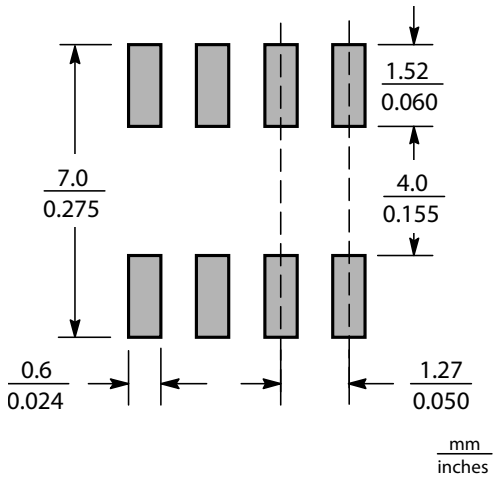
Switching time test circuit

Package Outline Dimensions



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	h	0.010	0.020	0.25	0.50
L	0.016	0.050	0.40	1.27	-	-	-	-	-

Suggested Pad Layout



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