ZXMC3AMC

30V COMPLEMENTARY PAIR ENHANCEMENT MODE MOSFET

Product Summary

Device	$V_{(BR)DSS}$	$R_{DS(on)}$ max	I_D max T_A = 25°C (Notes 4 & 7)
Q1	30V	120mΩ @ V_{GS} = 10V	3.7A
		180mΩ @ V_{GS} = 4.5V	3.0A
Q2	-30V	210mΩ @ V_{GS} = -10V	-2.7A
		330mΩ @ V_{GS} = -4.5V	-2.2A

Features and Benefits

- Low profile package, for thin applications
- Low $R_{\theta JA}$, thermally efficient package
- 6mm^2 footprint, 50% smaller than TSOP6 and SOT23-6
- Low on-resistance
- Fast switching speed
- **"Lead-Free", RoHS Compliant (Note 1)**
- **Halogen and Antimony Free. "Green" Device (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Description and Applications

This MOSFET has been designed to minimize the on-state resistance ($R_{DS(on)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

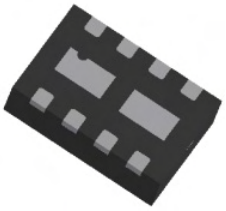
- MOSFET gate drive
- LCD backlight inverters
- Motor control
- Portable applications

Mechanical Data

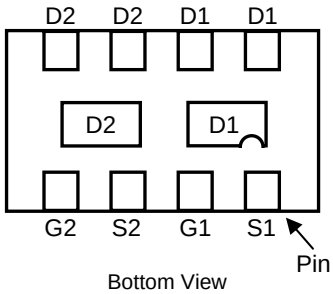
- Case: DFN3020B-8
- Terminals: Pre-Plated NiPdAu leadframe
- Nominal package height: 0.8mm
- UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Solderable per MIL-STD-202, Method 208
- Weight: 0.013 grams (approximate)

DFN3020B-8

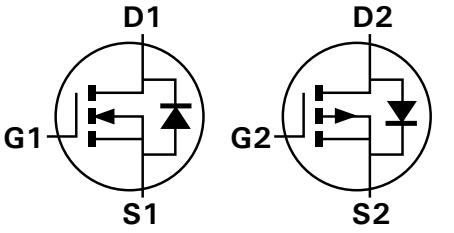
Top View



Bottom View



Bottom View
Pin-Out



Q1 N-Channel **Q2 P-Channel**

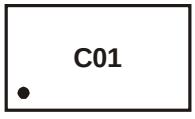
Equivalent Circuit

Ordering Information (Note 3)

Part Number	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXMC3AMCTA	C01	7	8	3000

Notes:
1. No purposefully added lead
2. Diodes Inc's "Green" policy can be found on our website at http://www.diodes.com.
3. For packaging details, go to our website at http://www.diodes.com.

Marking Information



C01 = Product Type Marking Code
Top view, Dot Denotes Pin 1

Maximum Ratings @T_A = 25°C unless otherwise specified

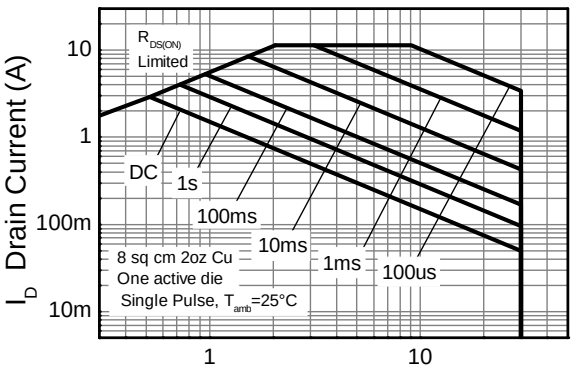
Characteristic			Symbol	N-channel – Q1	P-channel – Q2	Unit
Drain-Source Voltage			V_{DSS}	30	-30	V
Gate-Source Voltage			V_{GSS}	±20	±20	
Continuous Drain Current	V_{GS} = 10V	(Notes 4 & 7)	I_D	3.7	-2.7	A
		T_A = 70°C (Notes 4 & 7)		3.0	-2.2	
		(Notes 3 & 7)		2.9	-2.1	
Pulsed Drain Current	V_{GS} = 10V	(Notes 6 & 7)	I_{DM}	13	-9.2	
Continuous Source Current (Body diode)		(Notes 4 & 7)	I_S	3.2	-2.8	
Pulse Source Current (Body diode)		(Notes 6 & 7)	I_{SM}	13	-9.2	

Thermal Characteristics @T_A = 25°C unless otherwise specified

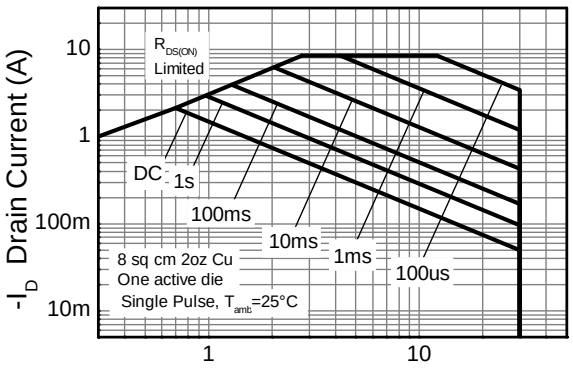
Characteristic		Symbol	N-channel – Q1	P-channel – Q2	Unit
Power Dissipation Linear Derating Factor	(Notes 3 & 7)	P_D	1.50 12		W mW/°C
	(Notes 4 & 7)		2.45 19.6		
	(Notes 5 & 7)		1.13 9		
	(Notes 5 & 8)		1.70 13.6		
Thermal Resistance, Junction to Ambient	(Notes 3 & 7)	$R_{\theta JA}$	83.3		°C/W
	(Notes 4 & 7)		51.0		
	(Notes 5 & 7)		111		
	(Notes 5 & 8)		73.5		
Thermal Resistance, Junction to Lead	(Notes 7 & 9)	$R_{\theta JL}$	17.1		
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150		°C

Notes:
3. For a device surface mounted on 28mm x 28mm (8cm^2) FR4 PCB with high coverage of single sided 2oz copper, in still air conditions; the device is measured when operating in a steady-state condition. The heatsink is split in half with the exposed drain pads connected to each half.
4. Same as note (3) except the device is measured at t < 5 sec.
5. Same as note (3), except the device is surface mounted on 31mm x 31mm (10cm^2) FR4 PCB with high coverage of single sided 1oz copper.
6. Same as note (3), except the device is pulsed with D = 0.02 and pulse width 300µs. The pulse current is limited by the maximum junction temperature.
7. For a dual device with one active die.
8. For dual device with 2 active die running at equal power.
9. Thermal resistance from junction to solder-point (at the end of the drain lead).

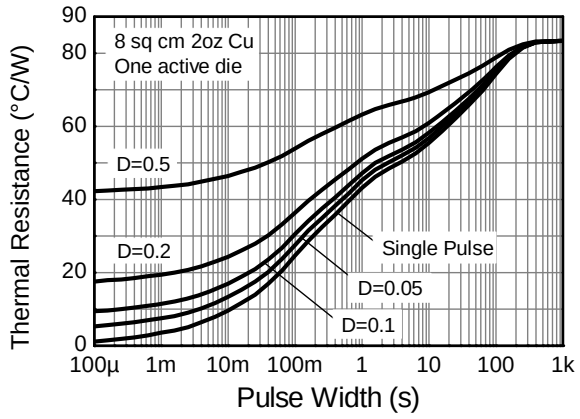
Thermal Characteristics



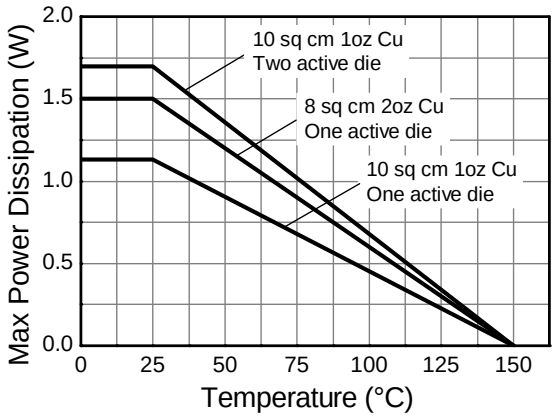
N-channel Safe Operating Area



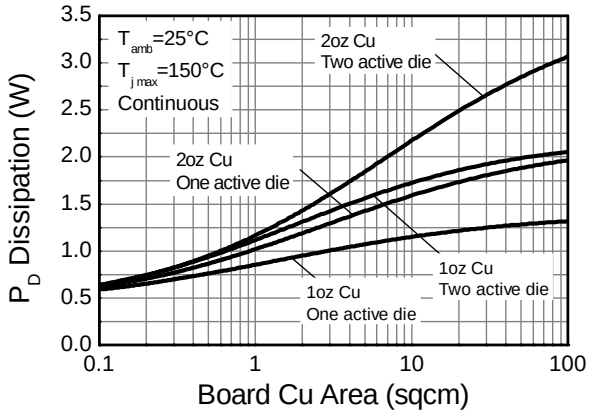
P-channel Safe Operating Area



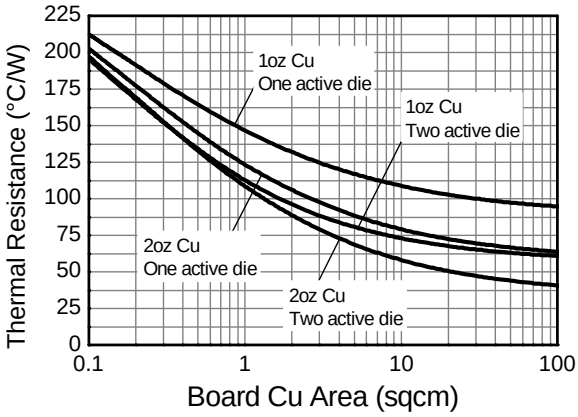
Transient Thermal Impedance



Derating Curve



Power Dissipation v Board Area



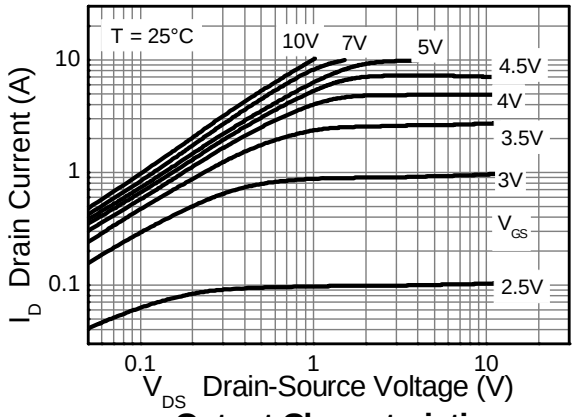
Thermal Resistance v Board Area

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

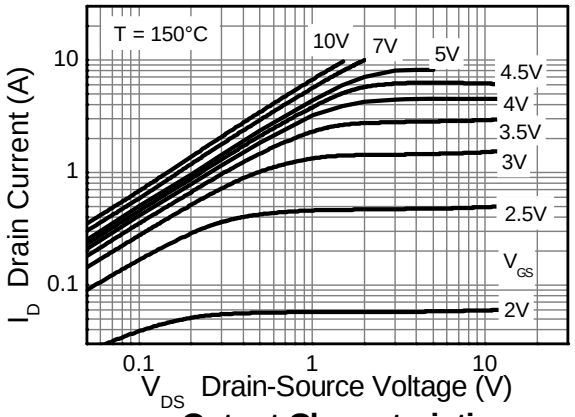
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	30	-	-	V	I_D = 250µA, V_{GS} = 0V
Zero Gate Voltage Drain Current	I_{DSS}	-	-	0.5	µA	V_{DS} = 30V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	-	-	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON 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 10)	$R_{DS\ (ON)}$	-	0.100	0.120	Ω	V_{GS} = 10V, I_D = 2.5A
			0.140	0.180		V_{GS} = 4.5V, I_D = 2.0A
Forward Transconductance (Note 10 & 11)	g_{fs}	-	3.5	-	S	V_{DS} = 10V, I_D = 2.5A
Diode Forward Voltage (Note 10)	V_{SD}	-	0.85	0.95	V	I_S = 1.7A, V_{GS} = 0V
Reverse Recover Time (Note 11)	t_{rr}	-	17.7	-	ns	I_S = 2.5A, di/dt= 100A/µs
Reverse Recover Charge (Note 11)	Q_{rr}	-	13.0	-	nC	
DYNAMIC CHARACTERISTICS (Note 11)						
Input Capacitance	C_{iss}	-	190	-	pF	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	-	38	-	pF	
Reverse Transfer Capacitance	C_{rss}	-	20	-	pF	
Total Gate Charge (Note 12)	Q_g	-	2.3	-	nC	V_{GS} = 4.5V; V_{DS} = 15V, I_D = 2.5A
Total Gate Charge (Note 12)	Q_g	-	3.9	-	nC	V_{GS} = 10V; V_{DS} = 15V, I_D = 2.5A
Gate-Source Charge (Note 12)	Q_{gs}	-	0.6	-	nC	
Gate-Drain Charge (Note 12)	Q_{gd}	-	0.9	-	nC	
Turn-On Delay Time (Note 12)	$t_{D(on)}$	-	1.7	-	ns	V_{DS} = 15V, I_D = 2.5A, V_{GS} = 10V, R_G = 6Ω
Turn-On Rise Time (Note 12)	t_r	-	2.3	-	ns	
Turn-Off Delay Time (Note 12)	$t_{D(off)}$	-	6.6	-	ns	
Turn-Off Fall Time (Note 12)	t_f	-	2.9	-	ns	

Notes: 10. Measured under pulsed conditions. Width ≤ 300µs. Duty cycle ≤ 2%.
11. For design aid only, not subject to production testing.
12. Switching characteristics are independent of operating junction temperature.

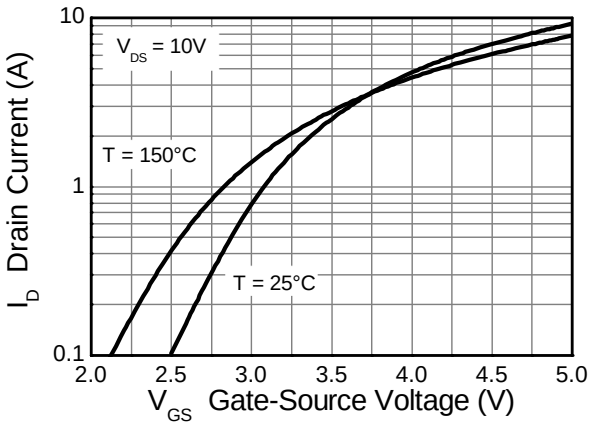
Typical Electrical Characteristics – Q1 N-Channel



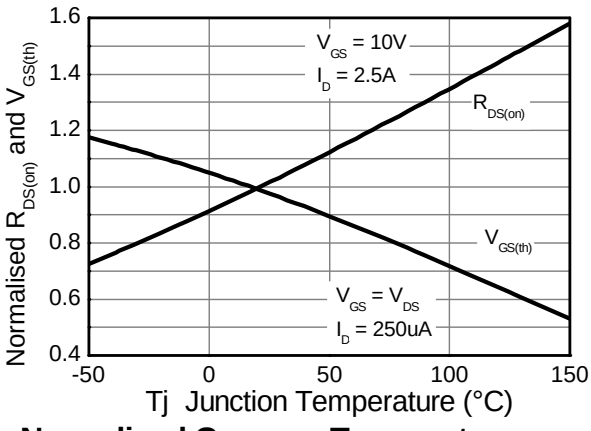
Output Characteristics



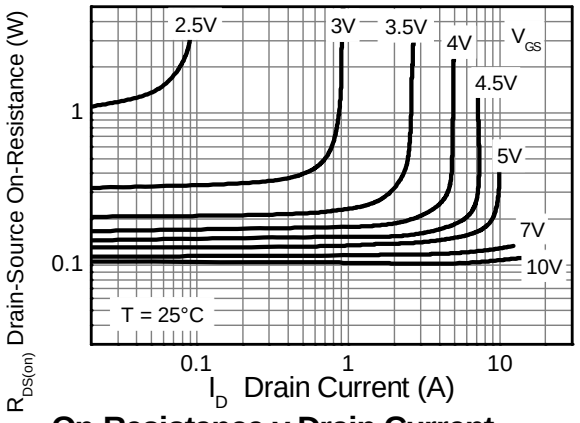
Output Characteristics



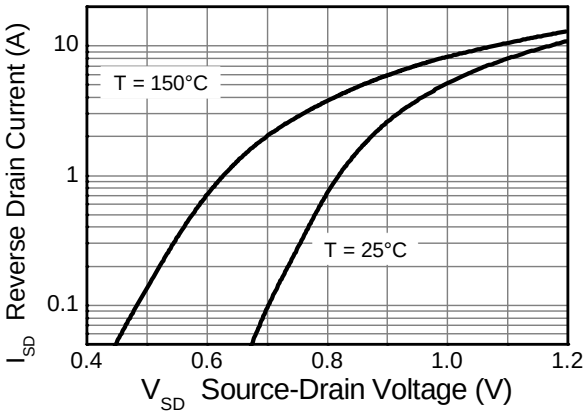
Typical Transfer Characteristics



Normalised Curves v Temperature

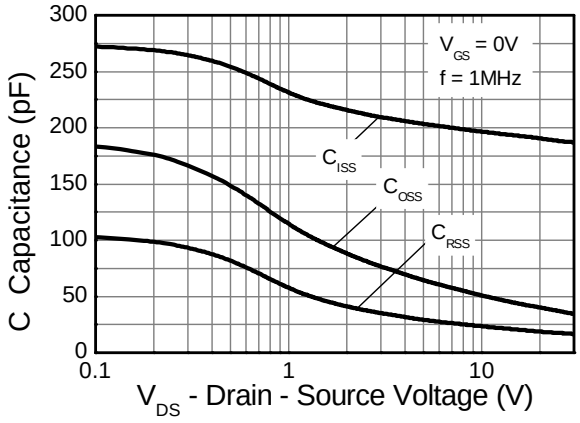


On-Resistance v Drain Current

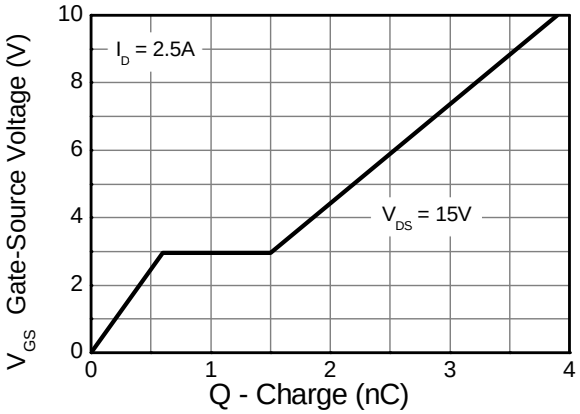


Source-Drain Diode Forward Voltage

Typical Electrical Characteristics – Q1 N-Channel - Continued

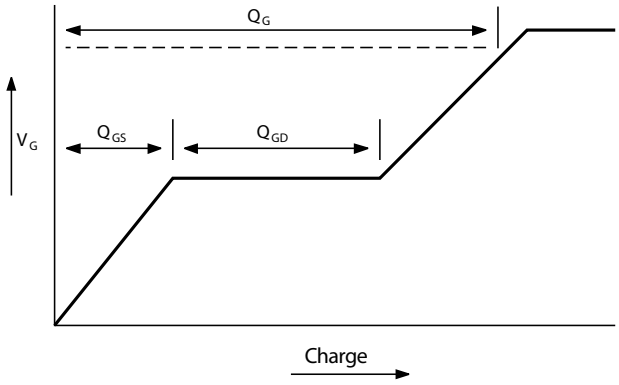


Capacitance v Drain-Source Voltage

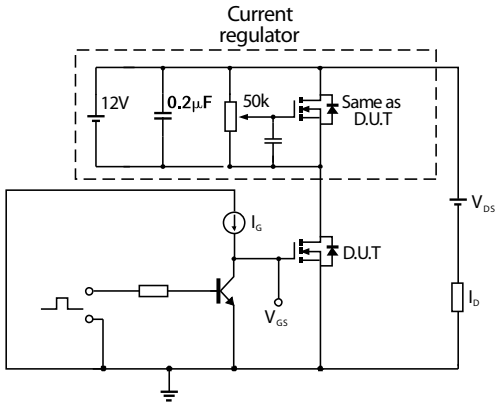


Gate-Source Voltage v Gate Charge

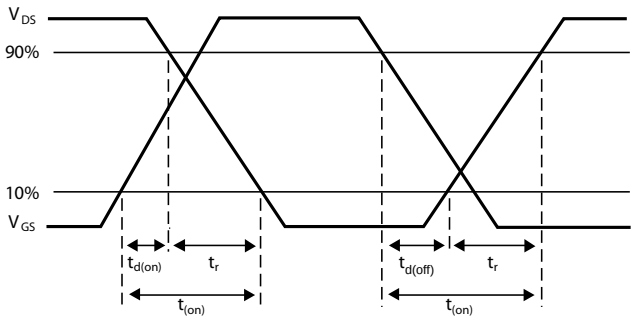
Test Circuits



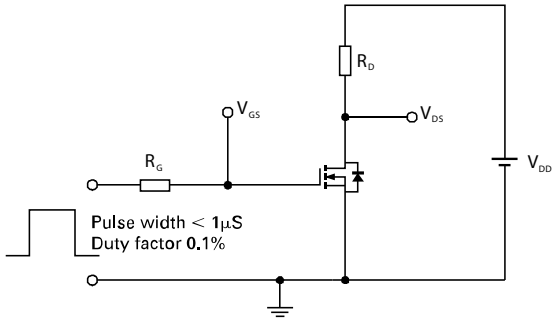
Basic gate charge waveform



Gate charge test circuit



Switching time waveforms



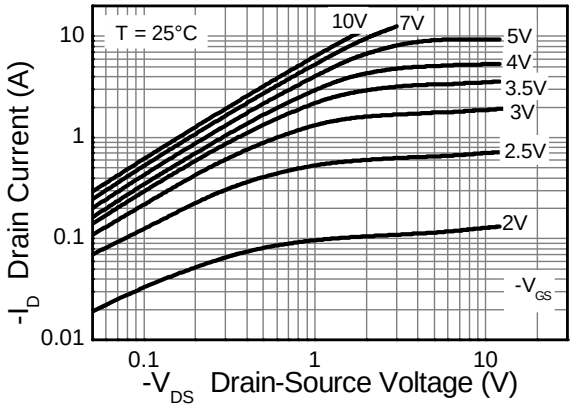
Switching time test circuit

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

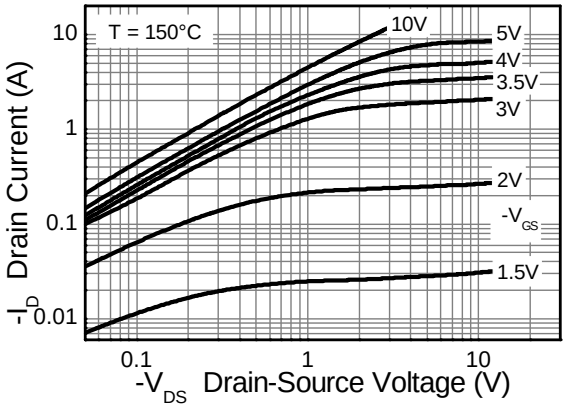
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	-30	-	-	V	I_D = -250µA, V_{GS} = 0V
Zero Gate Voltage Drain Current	I_{DSS}	-	-	-0.5	µA	V_{DS} = -30V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	-	-	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
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 13)	$R_{DS\ (ON)}$	-	0.150	0.210	Ω	V_{GS} = -10V, I_D = -1.4A
			0.280	0.330		V_{GS} = -4.5V, I_D = -1.1A
Forward Transconductance (Note 13 & 14)	g_{fs}	-	2.48	-	S	V_{DS} = -15V, I_D = -1.4A
Diode Forward Voltage (Note 13)	V_{SD}	-	-0.85	-0.95	V	I_S = -1.1A, V_{GS} = 0V
Reverse Recover Time (Note 14)	t_{rr}	-	18.6	-	ns	I_S = -0.95A, di/dt = 100A/µs
Reverse Recover Charge (Note 14)	Q_{rr}	-	14.8	-	nC	
DYNAMIC CHARACTERISTICS (Note 14)						
Input Capacitance	C_{iss}	-	206	-	pF	V_{DS} = -15V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	-	59.3	-	pF	
Reverse Transfer Capacitance	C_{rss}	-	49.2	-	pF	
Total Gate Charge (Note 15)	Q_g	-	3.8	-	nC	V_{GS} = -4.5V; V_{DS} = -15V, I_D = -1.4A
Total Gate Charge (Note 15)	Q_g	-	6.4	-	nC	V_{GS} = -10V; V_{DS} = -15V, I_D = -1.4A
Gate-Source Charge (Note 15)	Q_{gs}	-	0.69	-	nC	
Gate-Drain Charge (Note 15)	Q_{gd}	-	2.0	-	nC	
Turn-On Delay Time (Note 15)	$t_{D(on)}$	-	1.5	-	ns	V_{DS} = -15V, I_D = -1A, V_{GS} = -10V, R_G = 6Ω
Turn-On Rise Time (Note 15)	t_r	-	2.8	-	ns	
Turn-Off Delay Time (Note 15)	$t_{D(off)}$	-	11.3	-	ns	
Turn-Off Fall Time (Note 15)	t_f	-	7.5	-	ns	

Notes: 13. Measured under pulsed conditions. Width ≤ 300µs. Duty cycle ≤ 2%.
14. For design aid only, not subject to production testing.
15. Switching characteristics are independent of operating junction temperature.

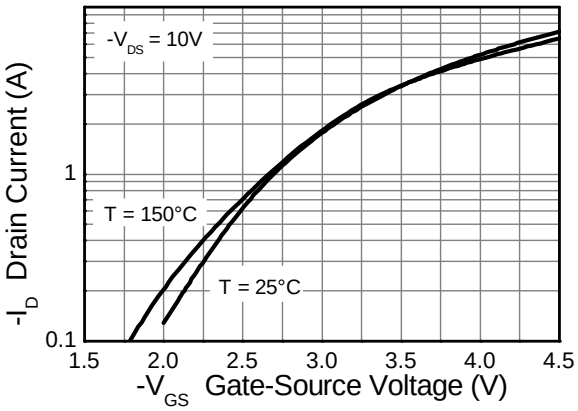
Typical Electrical Characteristics – Q2 P-Channel



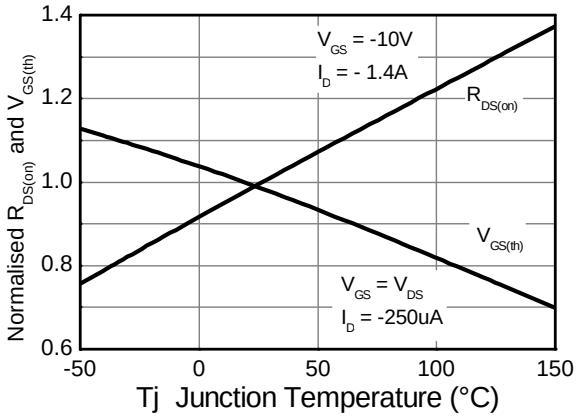
Output Characteristics



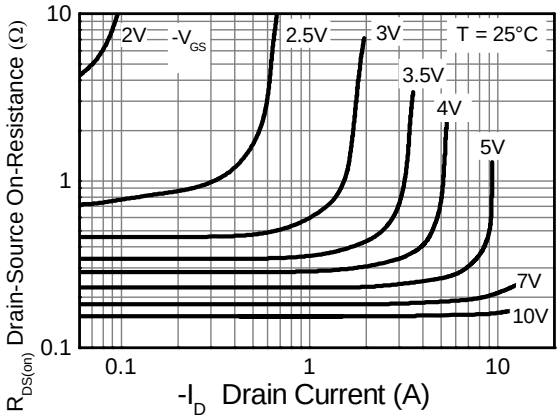
Output Characteristics



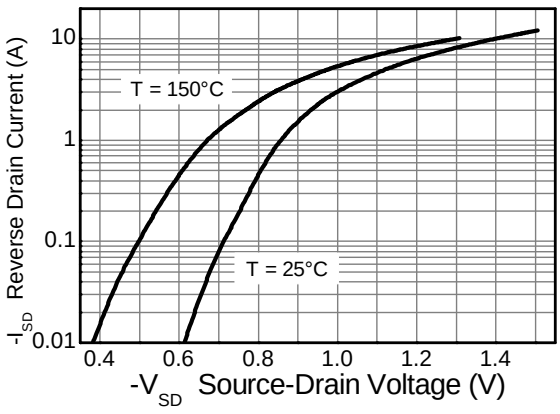
Typical Transfer Characteristics



Normalised Curves v Temperature

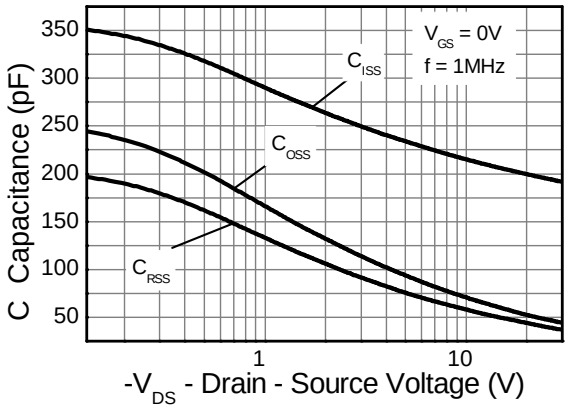


On-Resistance v Drain Current

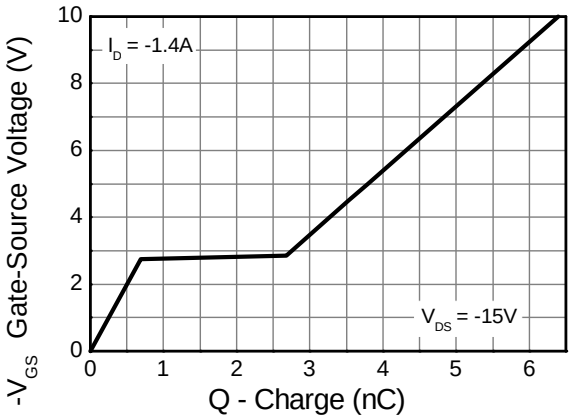


Source-Drain Diode Forward Voltage

Typical Electrical Characteristics – Q2 P-Channel - Continued

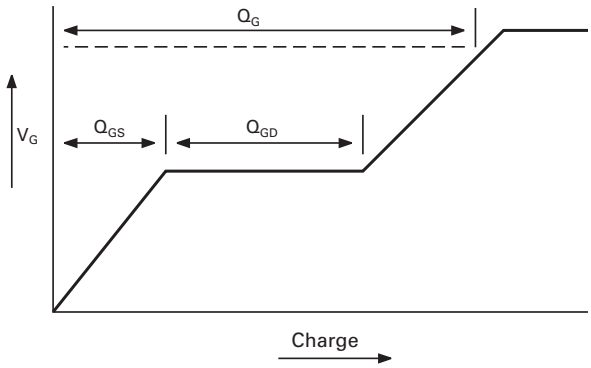


Capacitance v Drain-Source Voltage

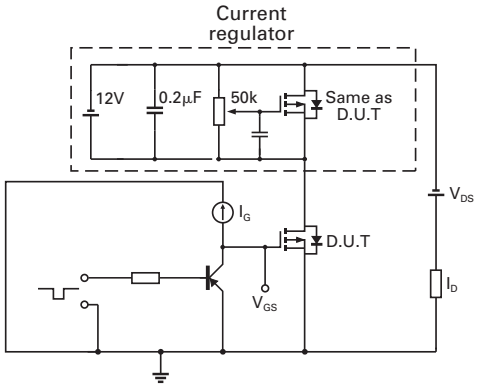


Gate-Source Voltage v Gate Charge

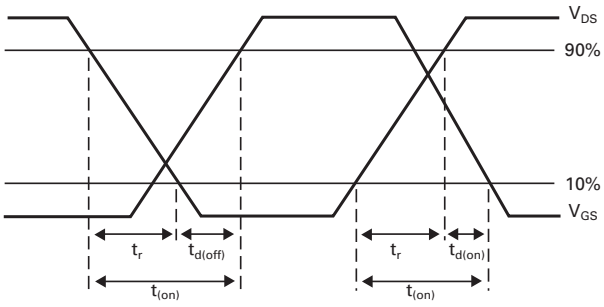
Test Circuits



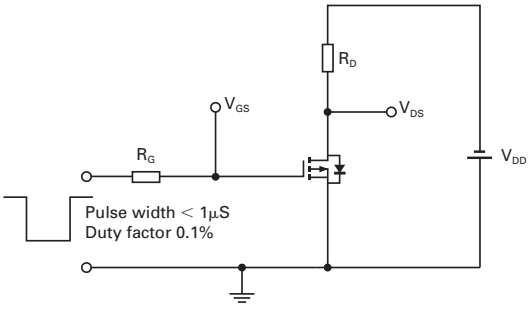
Basic gate charge waveform



Gate charge test circuit

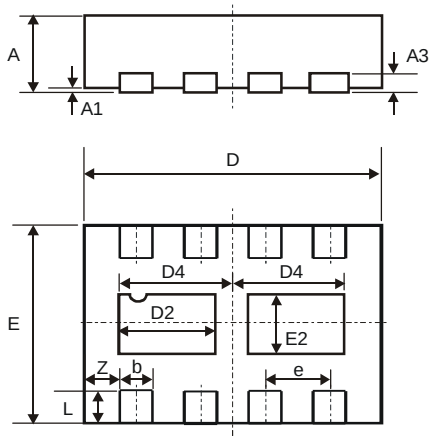


Switching time waveforms



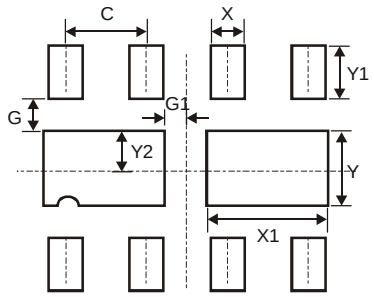
Switching time test circuit

Package Outline Dimensions



DFN3020B-8			
Dim	**Min**	**Max**	**Typ**
A	0.77	0.83	0.80
A1	0	0.05	0.02
A3	-	-	0.15
b	0.25	0.35	0.30
D	2.95	3.075	3.00
D2	0.82	1.02	0.92
D4	1.01	1.21	1.11
e	-	-	0.65
E	1.95	2.075	2.00
E2	0.43	0.63	0.53
L	0.25	0.35	0.30
Z	-	-	0.375
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
C	0.650
G	0.285
G1	0.090
X	0.400
X1	1.120
Y	0.730
Y1	0.500
Y2	0.365

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Общество с ограниченной ответственностью «МосЧип» ИНН 7719860671 / КПП 771901001
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