

**ZXMC3AMC**

**30V COMPLEMENTARY PAIR ENHANCEMENT MODE MOSFET**

**Product Summary**

Device	V <sub>(BR)DSS</sub>	R <sub>DS(on)</sub> max	I <sub>D</sub> max T <sub>A</sub> = 25°C (Notes 4 & 7)
Q1	30V	120mΩ @ V <sub>GS</sub> = 10V	3.7A
		180mΩ @ V <sub>GS</sub> = 4.5V	3.0A
Q2	-30V	210mΩ @ V <sub>GS</sub> = -10V	-2.7A
		330mΩ @ V <sub>GS</sub> = -4.5V	-2.2A

**Description and Applications**

This MOSFET has been designed to minimize the on-state resistance (R<sub>DS(on)</sub>) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

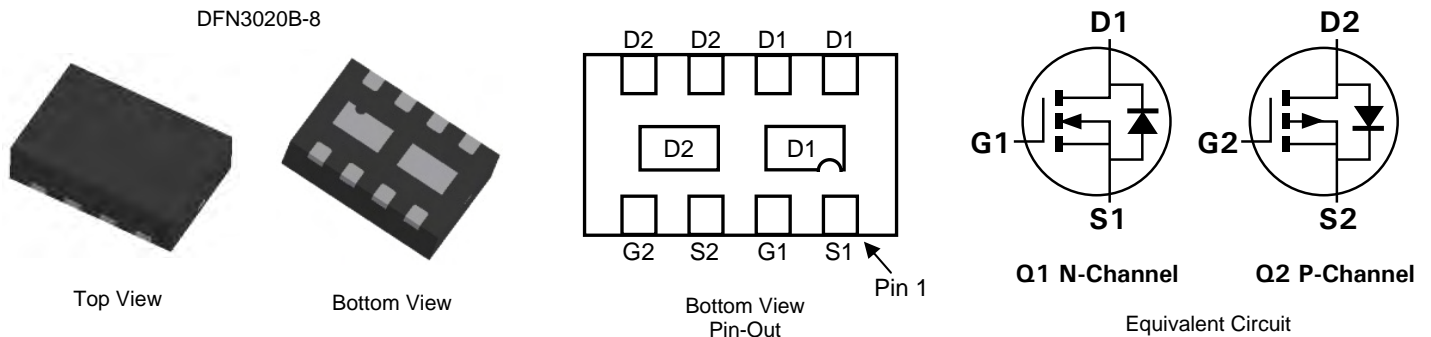
- MOSFET gate drive
- LCD backlight inverters
- Motor control
- Portable applications

**Features and Benefits**

- Low profile package, for thin applications
- Low R<sub>θJA</sub>, thermally efficient package
- 6mm<sup>2</sup> 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

**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)

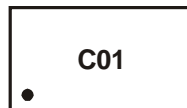


**Ordering Information** (Note 3)

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** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

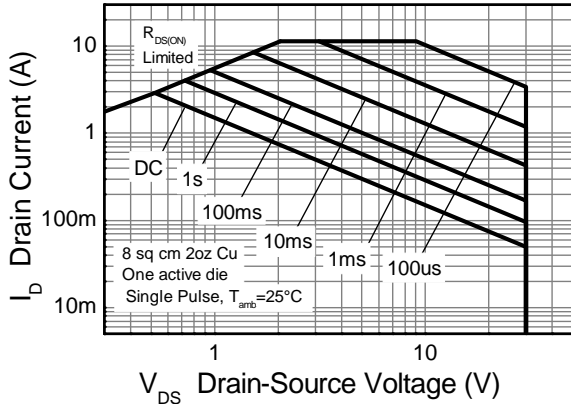
Characteristic			Symbol	N-channel – Q1	P-channel – Q2	Unit
Drain-Source Voltage			$V_{DSS}$	30	-30	V
Gate-Source Voltage			$V_{GSS}$	$\pm 20$	$\pm 20$	
Continuous Drain Current	$V_{GS} = 10\text{V}$	(Notes 4 & 7)	$I_D$	3.7	-2.7	A
		$T_A = 70^\circ\text{C}$ (Notes 4 & 7)		3.0	-2.2	
		(Notes 3 & 7)		2.9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

**Thermal Characteristics** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

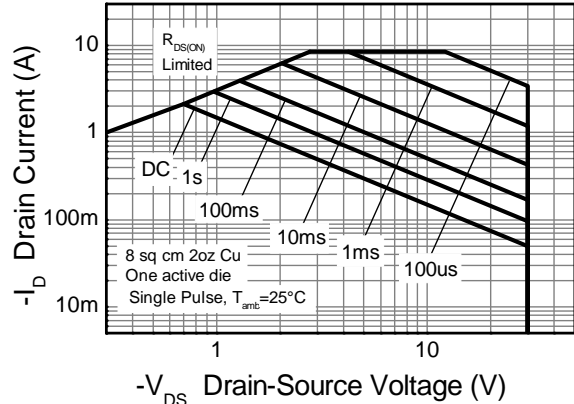
Characteristic		Symbol	N-channel – Q1	P-channel – Q2	Unit
Power Dissipation Linear Derating Factor	(Notes 3 & 7)	$P_D$	1.50		W mW/ $^\circ\text{C}$
	(Notes 4 & 7)		12		
	(Notes 5 & 7)		2.45		
	(Notes 5 & 8)		19.6		
	(Notes 5 & 8)		1.13		
Thermal Resistance, Junction to Ambient	(Notes 3 & 7)	$R_{\theta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

- Notes:
3. For a device surface mounted on 28mm x 28mm (8cm<sup>2</sup>) 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<sup>2</sup>) 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 300 $\mu\text{s}$ . 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).

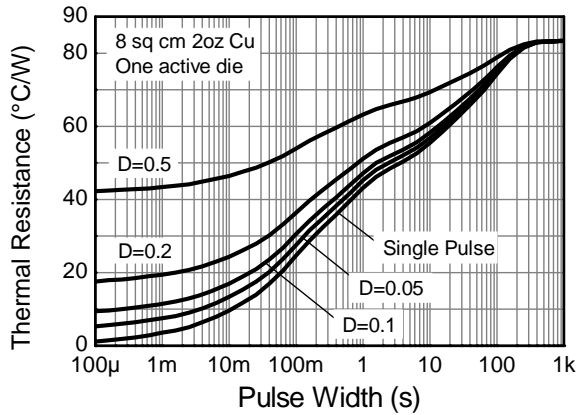
**Thermal Characteristics**



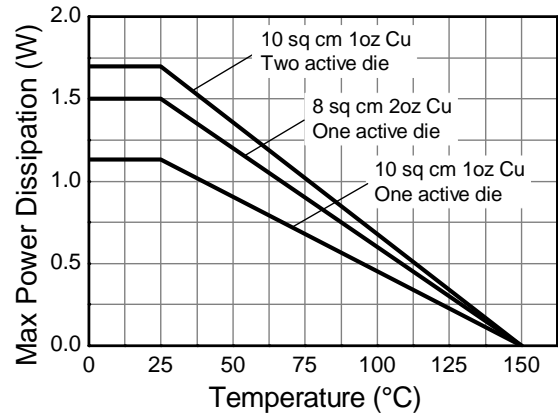
**N-channel Safe Operating Area**



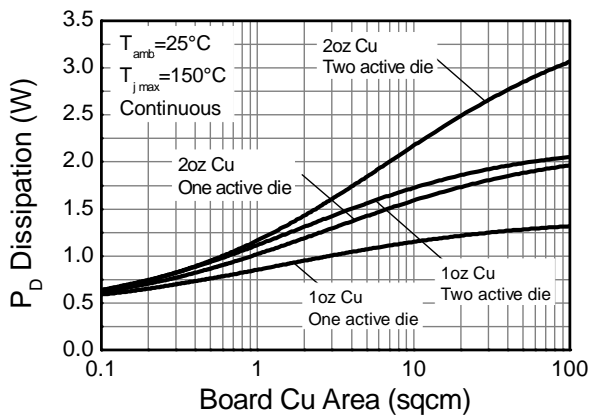
**P-channel Safe Operating Area**



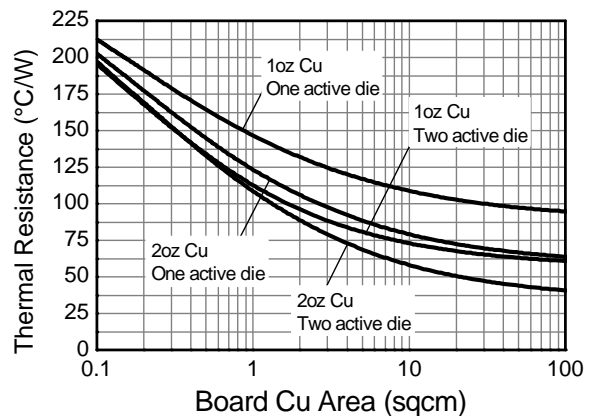
**Transient Thermal Impedance**



**Derating Curve**



**Power Dissipation v Board Area**



**Thermal Resistance v Board Area**

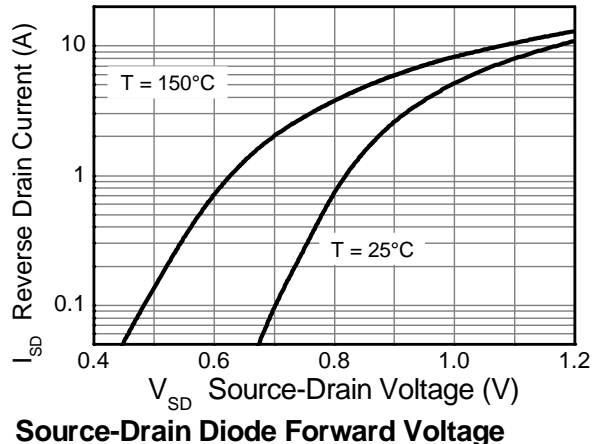
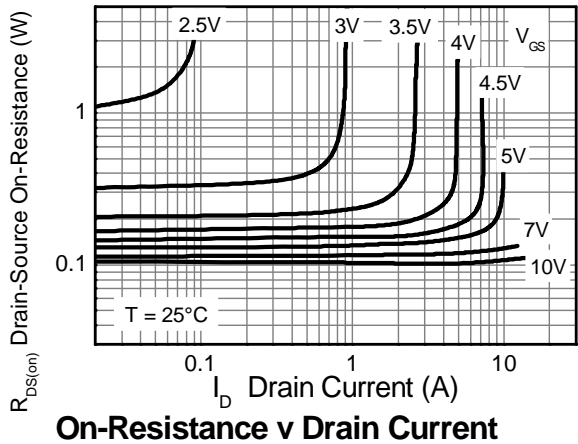
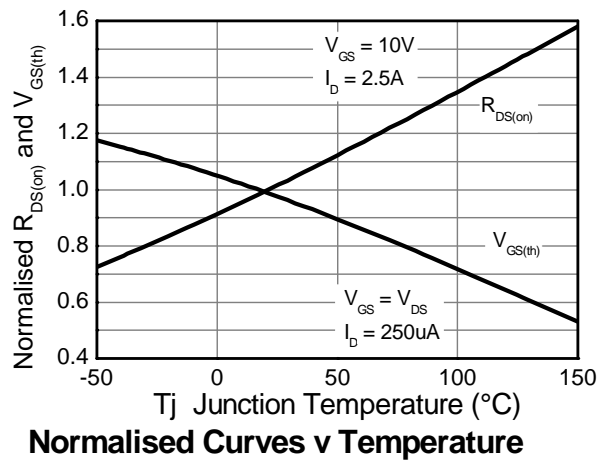
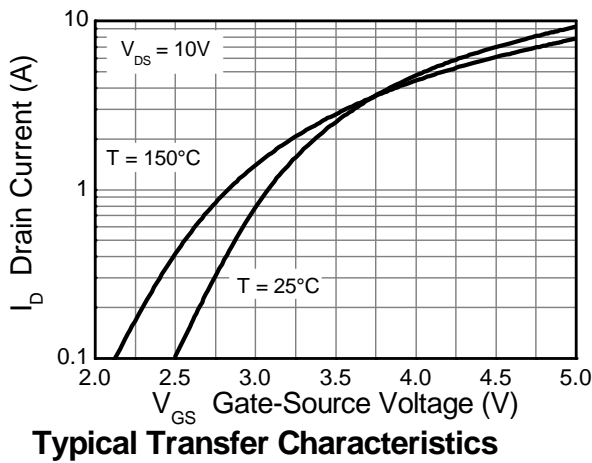
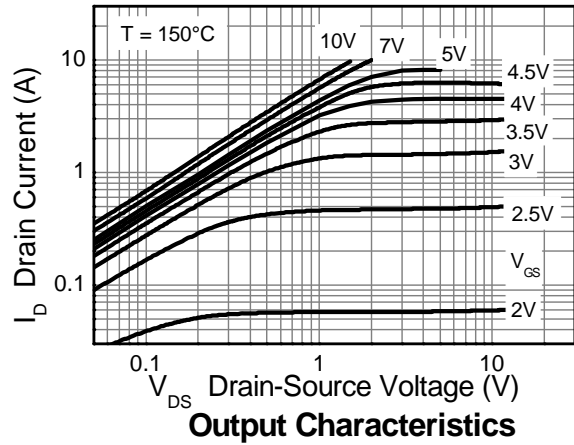
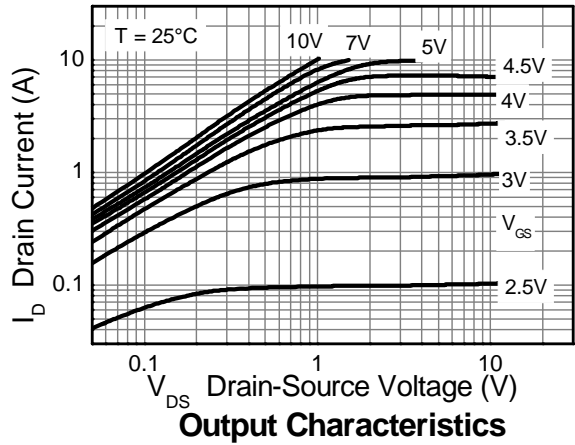
**ZXMC3AMC**

**Electrical Characteristics – Q1 N-Channel** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

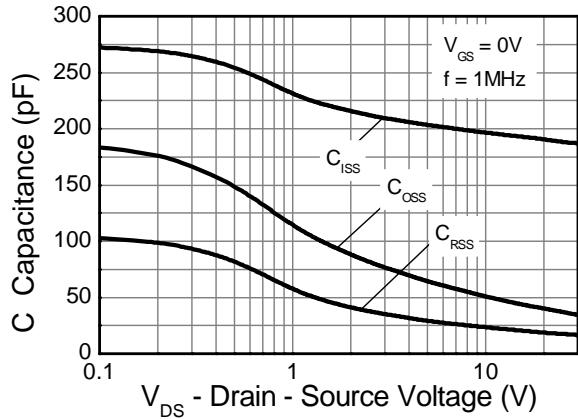
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	30	-	-	V	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$
Zero Gate Voltage Drain Current	$I_{DSS}$	-	-	0.5	$\mu\text{A}$	$V_{DS} = 30\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	-	-	$\pm 100$	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(th)}$	1.0	-	3.0	V	$I_D = 250\mu\text{A}, V_{DS} = V_{GS}$
Static Drain-Source On-Resistance (Note 10)	$R_{DS(on)}$	-	0.100	0.120	$\Omega$	$V_{GS} = 10\text{V}, I_D = 2.5\text{A}$
			0.140	0.180		$V_{GS} = 4.5\text{V}, I_D = 2.0\text{A}$
Forward Transconductance (Note 10 & 11)	$g_{fs}$	-	3.5	-	S	$V_{DS} = 10\text{V}, I_D = 2.5\text{A}$
Diode Forward Voltage (Note 10)	$V_{SD}$	-	0.85	0.95	V	$I_S = 1.7\text{A}, V_{GS} = 0\text{V}$
Reverse Recover Time (Note 11)	$t_{rr}$	-	17.7	-	ns	$I_S = 2.5\text{A}, di/dt = 100\text{A}/\mu\text{s}$
Reverse Recover Charge (Note 11)	$Q_{rr}$	-	13.0	-	nC	
<b>DYNAMIC CHARACTERISTICS (Note 11)</b>						
Input Capacitance	$C_{iss}$	-	190	-	pF	$V_{DS} = 25\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Output Capacitance	$C_{oss}$	-	38	-	pF	
Reverse Transfer Capacitance	$C_{rss}$	-	20	-	pF	
Total Gate Charge (Note 12)	$Q_g$	-	2.3	-	nC	$V_{GS} = 4.5\text{V}$
Total Gate Charge (Note 12)	$Q_g$	-	3.9	-	nC	$V_{GS} = 10\text{V}$
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	$V_{DS} = 15\text{V}, I_D = 2.5\text{A}$ $V_{GS} = 10\text{V}, R_G = 6\Omega$
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  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .  
 11. For design aid only, not subject to production testing.  
 12. Switching characteristics are independent of operating junction temperature.

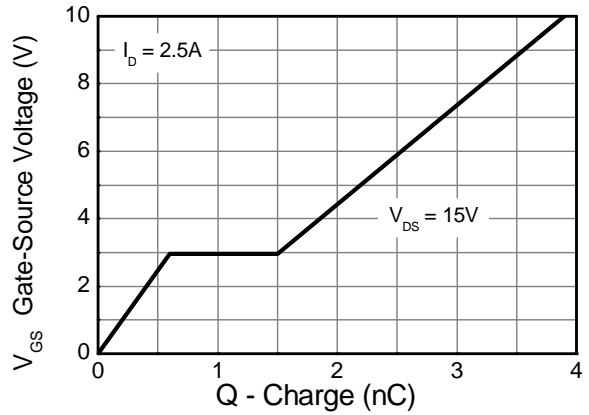
**Typical Electrical Characteristics – Q1 N-Channel**



**Typical Electrical Characteristics – Q1 N-Channel - Continued**

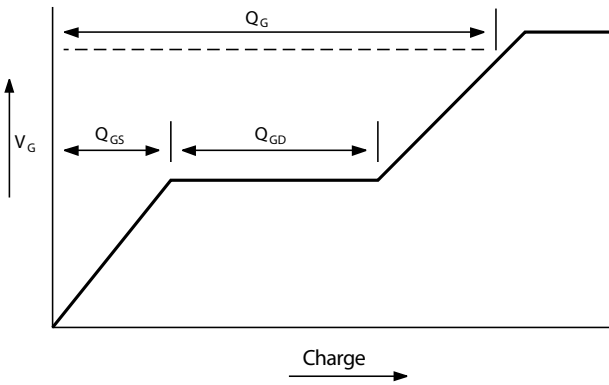


**Capacitance v Drain-Source Voltage**

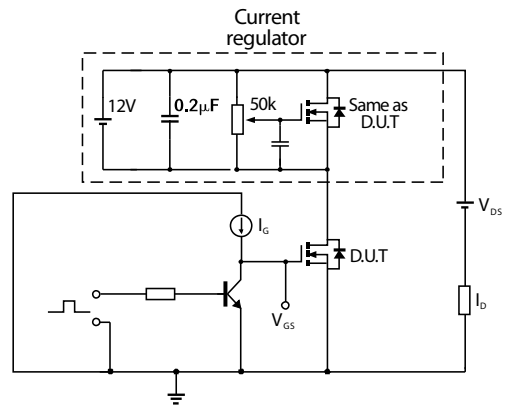


**Gate-Source Voltage v Gate Charge**

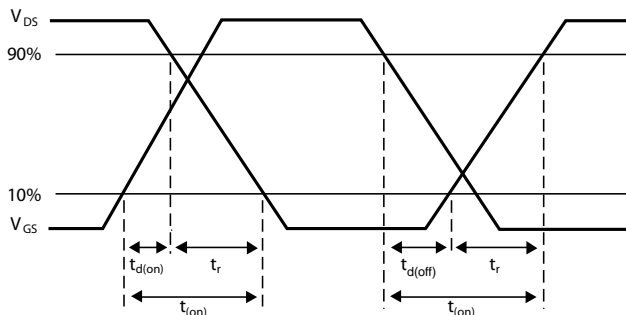
**Test Circuits**



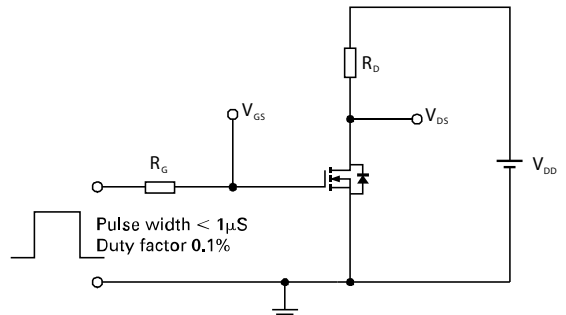
**Basic gate charge waveform**



**Gate charge test circuit**



**Switching time waveforms**



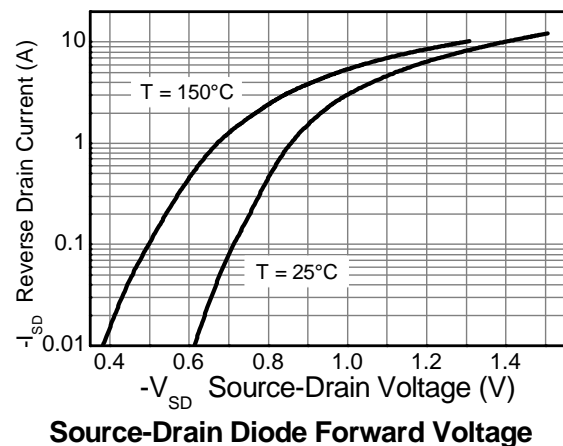
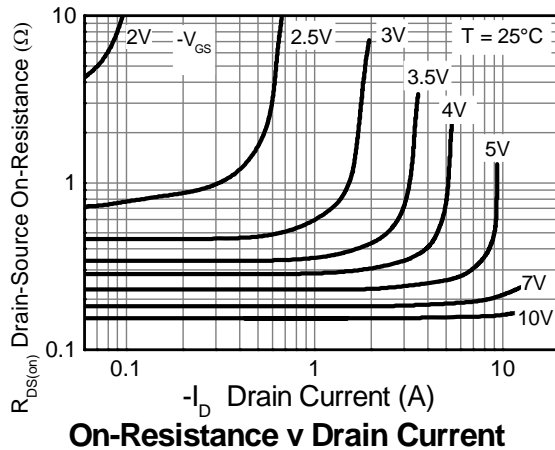
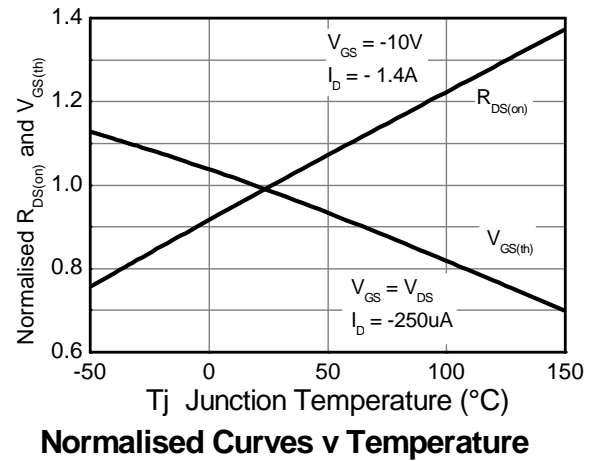
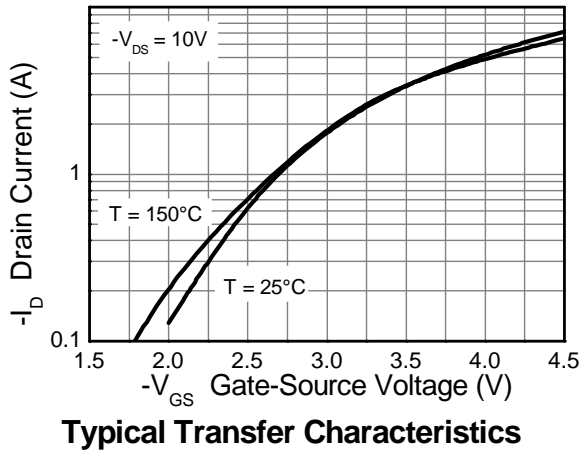
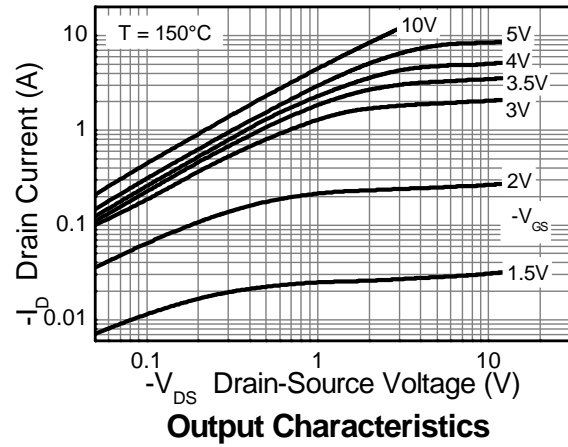
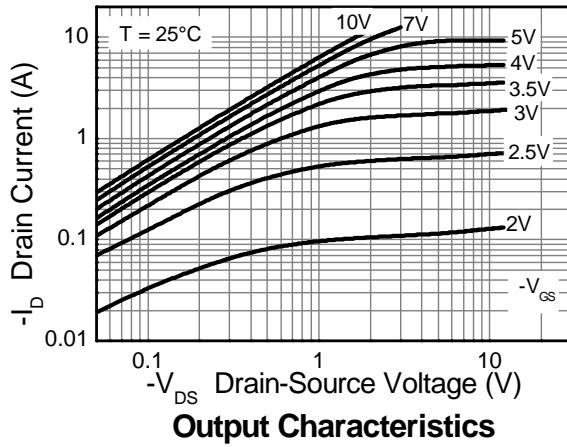
**Switching time test circuit**

**Electrical Characteristics – Q2 P-Channel** @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-30	-	-	V	I <sub>D</sub> = -250μA, V <sub>GS</sub> = 0V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	-	-	-0.5	μA	V <sub>DS</sub> = -30V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	-	-	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	-1.0	-	-3.0	V	I <sub>D</sub> = -250μA, V <sub>DS</sub> = V <sub>GS</sub>
Static Drain-Source On-Resistance (Note 13)	R <sub>DS(on)</sub>	-	0.150	0.210	Ω	V <sub>GS</sub> = -10V, I <sub>D</sub> = -1.4A
			0.280	0.330		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -1.1A
Forward Transconductance (Note 13 & 14)	g <sub>fs</sub>	-	2.48	-	S	V <sub>DS</sub> = -15V, I <sub>D</sub> = -1.4A
Diode Forward Voltage (Note 13)	V <sub>SD</sub>	-	-0.85	-0.95	V	I <sub>S</sub> = -1.1A, V <sub>GS</sub> = 0V
Reverse Recover Time (Note 14)	t <sub>rr</sub>	-	18.6	-	ns	I <sub>S</sub> = -0.95A, di/dt = 100A/μs
Reverse Recover Charge (Note 14)	Q <sub>rr</sub>	-	14.8	-	nC	
<b>DYNAMIC CHARACTERISTICS (Note 14)</b>						
Input Capacitance	C <sub>iSS</sub>	-	206	-	pF	V <sub>DS</sub> = -15V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	-	59.3	-	pF	
Reverse Transfer Capacitance	C <sub>rSS</sub>	-	49.2	-	pF	
Total Gate Charge (Note 15)	Q <sub>g</sub>	-	3.8	-	nC	V <sub>GS</sub> = -4.5V
Total Gate Charge (Note 15)	Q <sub>g</sub>	-	6.4	-	nC	V <sub>GS</sub> = -10V
Gate-Source Charge (Note 15)	Q <sub>gs</sub>	-	0.69	-	nC	
Gate-Drain Charge (Note 15)	Q <sub>gd</sub>	-	2.0	-	nC	
Turn-On Delay Time (Note 15)	t <sub>D(on)</sub>	-	1.5	-	ns	V <sub>DS</sub> = -15V, I <sub>D</sub> = -1A V <sub>GS</sub> = -10V, R <sub>G</sub> = 6Ω
Turn-On Rise Time (Note 15)	t <sub>r</sub>	-	2.8	-	ns	
Turn-Off Delay Time (Note 15)	t <sub>D(off)</sub>	-	11.3	-	ns	
Turn-Off Fall Time (Note 15)	t <sub>f</sub>	-	7.5	-	ns	

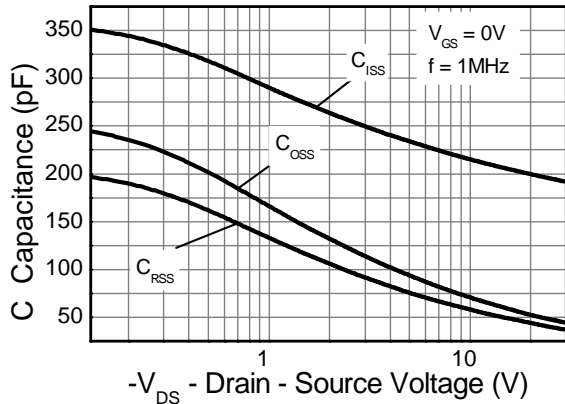
Notes: 13. Measured under pulsed conditions. Width ≤ 300μs. Duty cycle ≤ 2%.  
14. For design aid only, not subject to production testing.  
15. Switching characteristics are independent of operating junction temperature.

**Typical Electrical Characteristics – Q2 P-Channel**

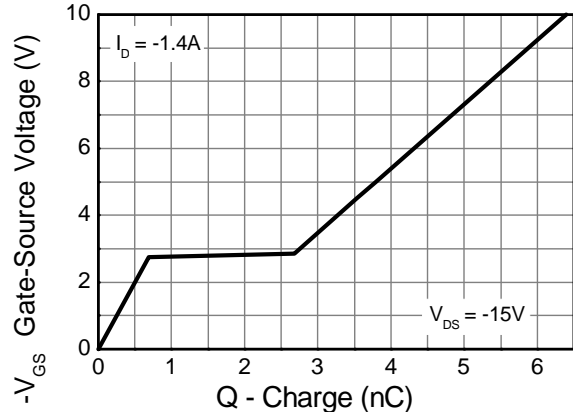




**Typical Electrical Characteristics – Q2 P-Channel - Continued**

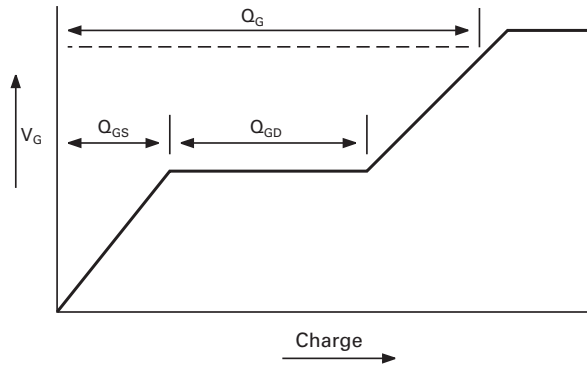


**Capacitance v Drain-Source Voltage**

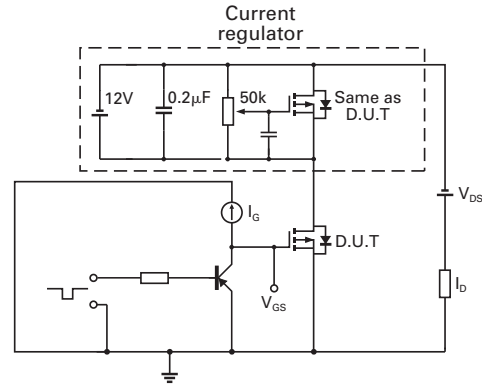


**Gate-Source Voltage v Gate Charge**

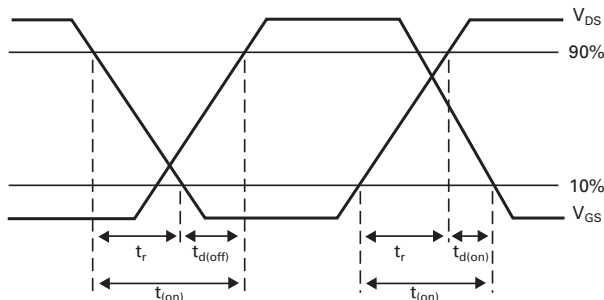
**Test Circuits**



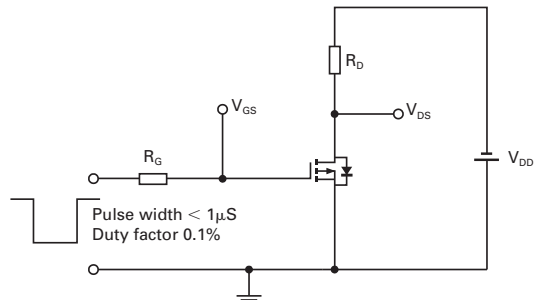
**Basic gate charge waveform**



**Gate charge test circuit**



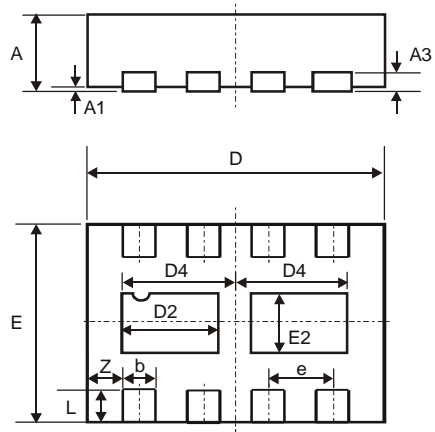
**Switching time waveforms**



**Switching time test circuit**

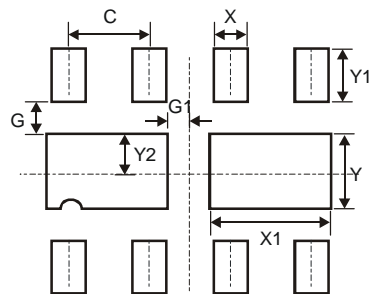
**ZXMC3AMC**

**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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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.

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- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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