

# ZXMC3A16DN8

## COMPLEMENTARY 30V ENHANCEMENT MODE MOSFET

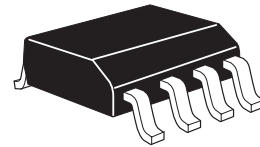
### SUMMARY

**N-Channel**  $V_{(BR)DSS} = 30V$ ;  $R_{DS(ON)} = 0.035\Omega$ ;  $I_D = 6.4A$

**P-Channel**  $V_{(BR)DSS} = -30V$ ;  $R_{DS(ON)} = 0.048\Omega$ ;  $I_D = -5.4A$

### DESCRIPTION

This new generation of trench MOSFETs from Zetex utilizes a unique structure that combines the benefits of low on-resistance with fast switching speed. This makes them ideal for high efficiency, low voltage, power management applications.



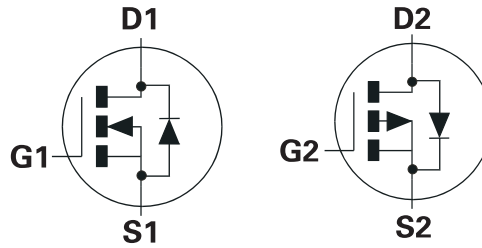
SO8

### FEATURES

- Low on-resistance
- Fast switching speed
- Low threshold
- Low gate drive
- Low profile SOIC package

### APPLICATIONS

- Motor Drive
- LCD backlighting



Q1 = N-CHANNEL

Q2 = P-CHANNEL

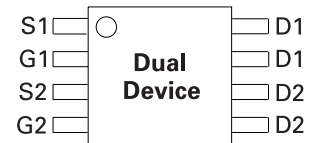
### ORDERING INFORMATION

| DEVICE        | REEL | TAPE WIDTH | QUANTITY PER REEL |
|---------------|------|------------|-------------------|
| ZXMC3A16DN8TA | 7"   | 12mm       | 500 units         |
| ZXMC3A16DN8TC | 13"  | 12mm       | 2500 units        |

### DEVICE MARKING

ZXMC  
3A16

### PINOUT



Top view

# ZXMC3A16DN8

## ABSOLUTE MAXIMUM RATINGS

| PARAMETER  | SYMBOL            | N-Channel   | P-Channel | UNIT                |
|--|-------------------|-------------|-----------|---------------------|
| Drain-Source Voltage   | $V_{DSS}$         | 30          | -30       | V                   |
| Gate-Source Voltage  | $V_{GS}$          | $\pm 20$    | $\pm 20$  | V                   |
| Continuous Drain Current @ $V_{GS}=10V$ ; $T_A=25^\circ C$ <sup>(b)(d)</sup><br>@ $V_{GS}=10V$ ; $T_A=70^\circ C$ <sup>(b)(d)</sup><br>@ $V_{GS}=10V$ ; $T_A=25^\circ C$ <sup>(a)(d)</sup> | $I_D$             | 6.4         | -5.4      | A                   |
|  |                   | 5.1         | -4.3      | A                   |
|  |                   | 4.9         | -4.1      | A                   |
| Pulsed Drain Current <sup>(c)</sup>  | $I_{DM}$          | 30          | -25       | A                   |
| Continuous Source Current (Body Diode) <sup>(b)</sup>  | $I_S$             | 3.4         | -3.2      | A                   |
| Pulsed Source Current (Body Diode) <sup>(c)</sup>  | $I_{SM}$          | 30          | -25       | A                   |
| Power Dissipation at $T_A=25^\circ C$ <sup>(a)(d)</sup><br>Linear Derating Factor  | $P_D$             | 1.25<br>10  |           | W<br>mW/ $^\circ C$ |
| Power Dissipation at $T_A=25^\circ C$ <sup>(a)(e)</sup><br>Linear Derating Factor  | $P_D$             | 1.8<br>14   |           | W<br>mW/ $^\circ C$ |
| Power Dissipation at $T_A=25^\circ C$ <sup>(b)(d)</sup><br>Linear Derating Factor  | $P_D$             | 2.1<br>17   |           | W<br>mW/ $^\circ C$ |
| Operating and Storage Temperature Range  | $T_j$ ; $T_{stg}$ | -55 to +150 |           | $^\circ C$          |

## THERMAL RESISTANCE

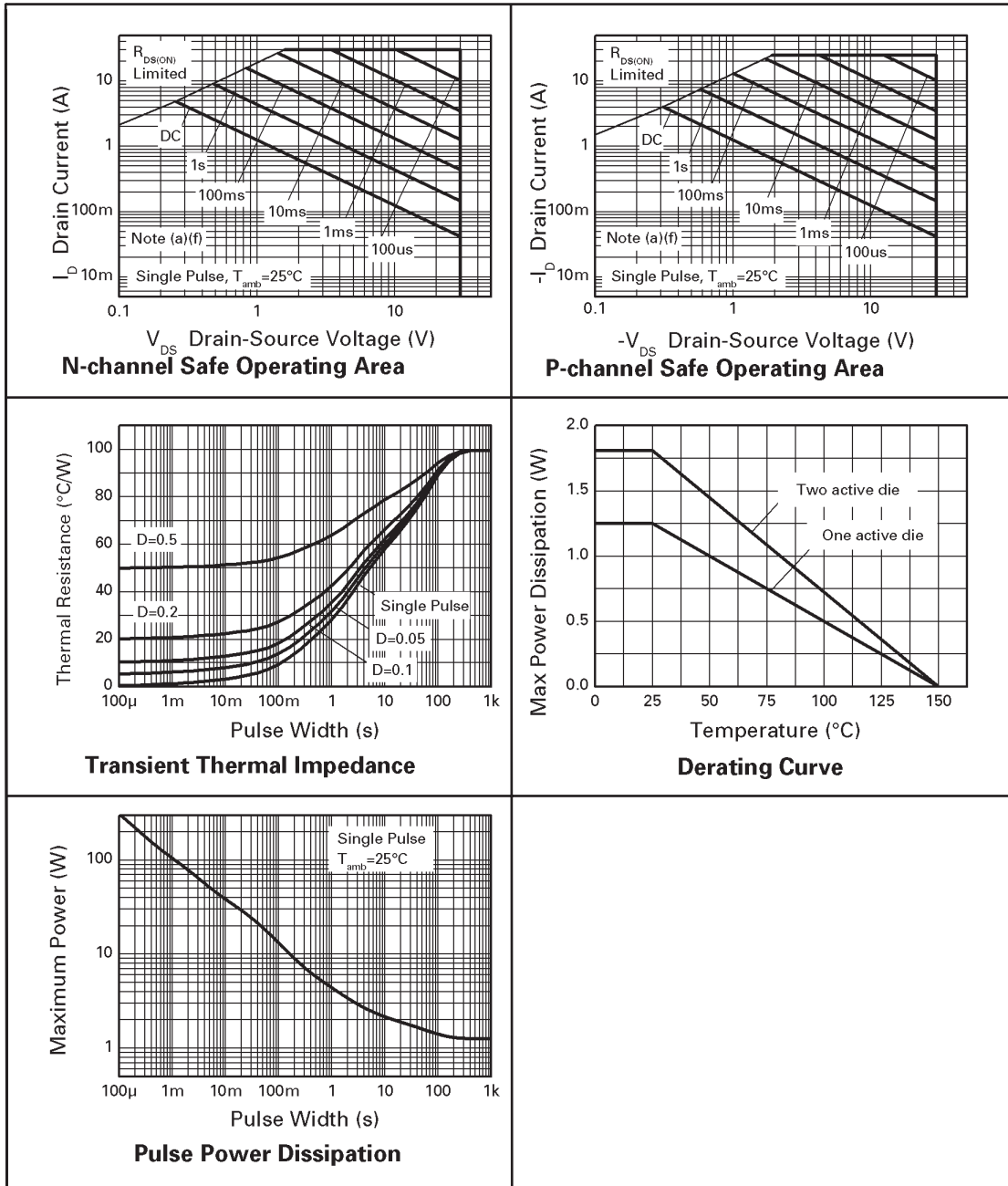
| PARAMETER                             | SYMBOL          | VALUE | UNIT         |
|---------------------------------------|-----------------|-------|--------------|
| Junction to Ambient <sup>(a)(d)</sup> | $R_{\theta JA}$ | 100   | $^\circ C/W$ |
| Junction to Ambient <sup>(b)(e)</sup> | $R_{\theta JA}$ | 70    | $^\circ C/W$ |
| Junction to Ambient <sup>(b)(d)</sup> | $R_{\theta JA}$ | 60    | $^\circ C/W$ |

### Notes

- (a) For a dual device surface mounted on 25mm x 25mm FR4 PCB with coverage of single sided 1oz copper in still air conditions.
- (b) For a dual device surface mounted on FR4 PCB measured at  $t \leq 10$  sec.
- (c) Repetitive rating 25mm x 25mm FR4 PCB,  $D=0.02$  pulse width=300 $\mu s$  - pulse width limited by maximum junction temperature.
- (d) For a dual device with one active die.
- (e) For dual device with 2 active die running at equal power.

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## CHARACTERISTICS



# ZXMC3A16DN8

## N-CHANNEL

### ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

| PARAMETER  | SYMBOL        | MIN. | TYP. | MAX.           | UNIT                 | CONDITIONS  |
|--|---------------|------|------|----------------|----------------------|---|
| <b>STATIC</b>  |               |      |      |                |                      |   |
| Drain-Source Breakdown Voltage                         | $V_{(BR)DSS}$ | 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-Body Leakage                                      | $I_{GSS}$     |      |      | 100            | nA                   | $V_{GS}=\pm 20\text{V}, V_{DS}=0\text{V}$                                     |
| Gate-Source Threshold Voltage                          | $V_{GS(th)}$  | 1    |      |                | V                    | $I_D=250\mu\text{A}, V_{DS}=V_{GS}$   |
| Static Drain-Source On-State Resistance <sup>(1)</sup> | $R_{DS(on)}$  |      |      | 0.035<br>0.050 | $\Omega$<br>$\Omega$ | $V_{GS}=10\text{V}, I_D=9\text{A}$<br>$V_{GS}=4.5\text{V}, I_D=7.4\text{A}$   |
| Forward Transconductance <sup>(1)(3)</sup>             | $g_{fs}$      |      | 13.5 |                | S                    | $V_{DS}=15\text{V}, I_D=9\text{A}$  |
| <b>DYNAMIC</b> <sup>(3)</sup>                          |               |      |      |                |                      |   |
| Input Capacitance                                      | $C_{iss}$     |      | 796  |                | pF                   | $V_{DS}=25\text{V}, V_{GS}=0\text{V},$<br>$f=1\text{MHz}$                     |
| Output Capacitance                                     | $C_{oss}$     |      | 137  |                | pF                   |   |
| Reverse Transfer Capacitance                           | $C_{rss}$     |      | 84   |                | pF                   |   |
| <b>SWITCHING</b> <sup>(2) (3)</sup>                    |               |      |      |                |                      |   |
| Turn-On Delay Time                                     | $t_{d(on)}$   |      | 3.0  |                | ns                   | $V_{DD}=15\text{V}, I_D=3.5\text{A}$<br>$R_G=6.0\Omega, V_{GS}=10\text{V}$    |
| Rise Time  | $t_r$         |      | 6.4  |                | ns                   |   |
| Turn-Off Delay Time                                    | $t_{d(off)}$  |      | 21.6 |                | ns                   |   |
| Fall Time  | $t_f$         |      | 9.4  |                | ns                   |   |
| Gate Charge  | $Q_g$         |      | 9.2  |                | nC                   | $V_{DS}=15\text{V}, V_{GS}=5\text{V},$<br>$I_D=3.5\text{A}$                   |
| Total Gate Charge                                      | $Q_g$         |      | 17.5 |                | nC                   | $V_{DS}=15\text{V}, V_{GS}=10\text{V},$<br>$I_D=3.5\text{A}$                  |
| Gate-Source Charge                                     | $Q_{gs}$      |      | 2.3  |                | nC                   |   |
| Gate-Drain Charge                                      | $Q_{gd}$      |      | 3.1  |                | nC                   |   |
| <b>SOURCE-DRAIN DIODE</b>                              |               |      |      |                |                      |   |
| Diode Forward Voltage <sup>(1)</sup>                   | $V_{SD}$      |      | 0.85 | 0.95           | V                    | $T_J=25^{\circ}\text{C}, I_S=5.1\text{A},$<br>$V_{GS}=0\text{V}$              |
| Reverse Recovery Time <sup>(3)</sup>                   | $t_{rr}$      |      | 17.8 |                | ns                   | $T_J=25^{\circ}\text{C}, I_F=3.5\text{A},$<br>$di/dt=100\text{A}/\mu\text{s}$ |
| Reverse Recovery Charge <sup>(3)</sup>                 | $Q_{rr}$      |      | 11.6 |                | nC                   |   |

#### NOTES

- (1) Measured under pulsed conditions. Width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$  .  
 (2) Switching characteristics are independent of operating junction temperature.  
 (3) For design aid only, not subject to production testing.



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## P-CHANNEL

### ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

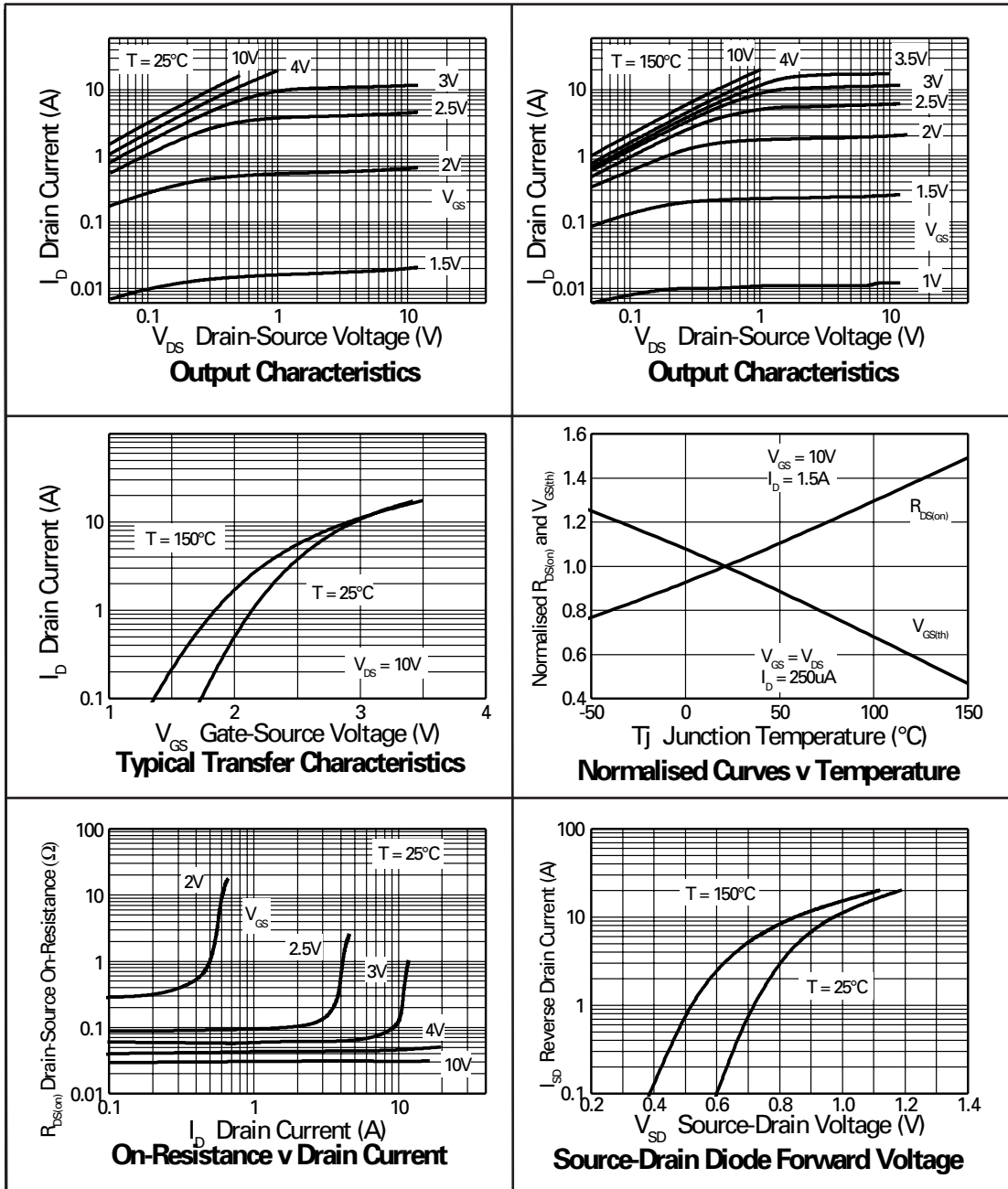
| PARAMETER  | SYMBOL        | MIN. | TYP.  | MAX.           | UNIT                 | CONDITIONS  |
|--|---------------|------|-------|----------------|----------------------|---|
| <b>STATIC</b>  |               |      |       |                |                      |   |
| Drain-Source Breakdown Voltage                         | $V_{(BR)DSS}$ | -30  |       |                | V                    | $I_D = -250\mu\text{A}$ , $V_{GS} = 0\text{V}$  |
| Zero Gate Voltage Drain Current                        | $I_{DSS}$     |      |       | -1.0           | $\mu\text{A}$        | $V_{DS} = -30\text{V}$ , $V_{GS} = 0\text{V}$   |
| Gate-Body Leakage                                      | $I_{GSS}$     |      |       | 100            | nA                   | $V_{GS} = \pm 20\text{V}$ , $V_{DS} = 0\text{V}$  |
| Gate-Source Threshold Voltage                          | $V_{GS(th)}$  | 1.0  |       |                | V                    | $I_D = -250\mu\text{A}$ , $V_{DS} = V_{GS}$   |
| Static Drain-Source On-State Resistance <sup>(1)</sup> | $R_{DS(on)}$  |      |       | 0.048<br>0.070 | $\Omega$<br>$\Omega$ | $V_{GS} = -10\text{V}$ , $I_D = -4.2\text{A}$<br>$V_{GS} = -4.5\text{V}$ , $I_D = -3.4\text{A}$ |
| Forward Transconductance <sup>(1)(3)</sup>             | $g_{fs}$      |      | 9.2   |                | S                    | $V_{DS} = -15\text{V}$ , $I_D = -4.2\text{A}$   |
| <b>DYNAMIC</b> <sup>(3)</sup>                          |               |      |       |                |                      |   |
| Input Capacitance                                      | $C_{iss}$     |      | 970   |                | pF                   | $V_{DS} = -15\text{V}$ , $V_{GS} = 0\text{V}$ ,<br>$f = 1\text{MHz}$                            |
| Output Capacitance                                     | $C_{oss}$     |      | 166   |                | pF                   |   |
| Reverse Transfer Capacitance                           | $C_{rss}$     |      | 116   |                | pF                   |   |
| <b>SWITCHING</b> <sup>(2) (3)</sup>                    |               |      |       |                |                      |   |
| Turn-On Delay Time                                     | $t_{d(on)}$   |      | 3.8   |                | ns                   | $V_{DD} = -15\text{V}$ , $I_D = -1\text{A}$<br>$R_G = 6.0\Omega$ , $V_{GS} = -10\text{V}$       |
| Rise Time  | $t_r$         |      | 6.1   |                | ns                   |   |
| Turn-Off Delay Time                                    | $t_{d(off)}$  |      | 35    |                | ns                   |   |
| Fall Time  | $t_f$         |      | 19    |                | ns                   |   |
| Gate Charge  | $Q_g$         |      | 12.9  |                | nC                   | $V_{DS} = -15\text{V}$ , $V_{GS} = -5\text{V}$ ,<br>$I_D = -4.2\text{A}$                        |
| Total Gate Charge                                      | $Q_g$         |      | 24.9  |                | nC                   | $V_{DS} = -15\text{V}$ , $V_{GS} = -10\text{V}$ ,<br>$I_D = -4.2\text{A}$                       |
| Gate-Source Charge                                     | $Q_{gs}$      |      | 2.67  |                | nC                   |   |
| Gate-Drain Charge                                      | $Q_{gd}$      |      | 3.86  |                | nC                   |   |
| <b>SOURCE-DRAIN DIODE</b>                              |               |      |       |                |                      |   |
| Diode Forward Voltage <sup>(1)</sup>                   | $V_{SD}$      |      | -0.85 | -0.95          | V                    | $T_J = 25^{\circ}\text{C}$ , $I_S = -3.6\text{A}$ ,<br>$V_{GS} = 0\text{V}$                     |
| Reverse Recovery Time <sup>(3)</sup>                   | $t_{rr}$      |      | 21.2  |                | ns                   | $T_J = 25^{\circ}\text{C}$ , $I_F = -2\text{A}$ ,<br>$di/dt = 100\text{A}/\mu\text{s}$          |
| Reverse Recovery Charge <sup>(3)</sup>                 | $Q_{rr}$      |      | 18.7  |                | nC                   |   |

#### NOTES

- (1) Measured under pulsed conditions. Width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .
- (2) Switching characteristics are independent of operating junction temperature.
- (3) For design aid only, not subject to production testing.

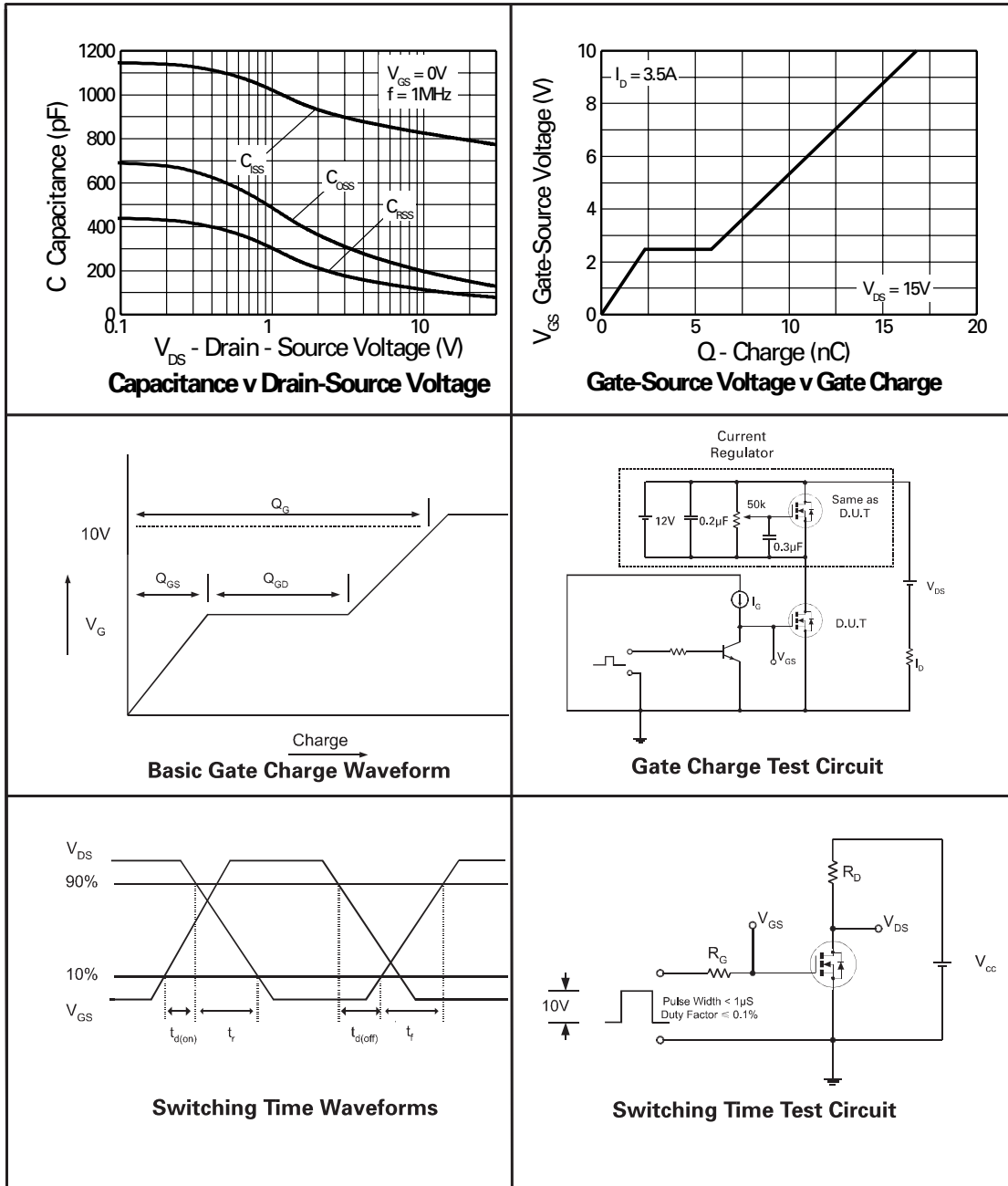
# ZXMC3A16DN8

## N-CHANNEL TYPICAL CHARACTERISTICS



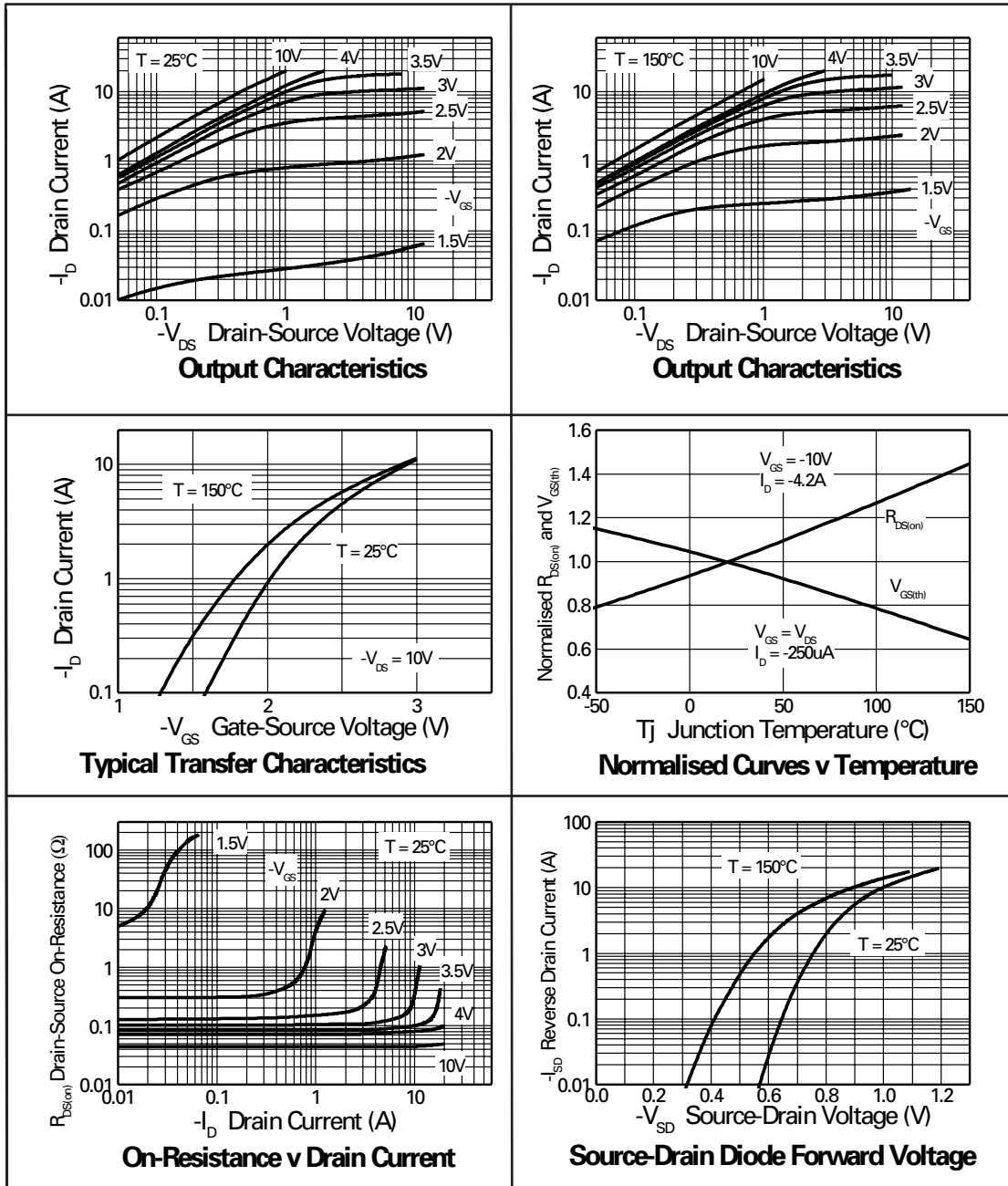
# ZXMC3A16DN8

## N-CHANNEL TYPICAL CHARACTERISTICS



# ZXMC3A16DN8

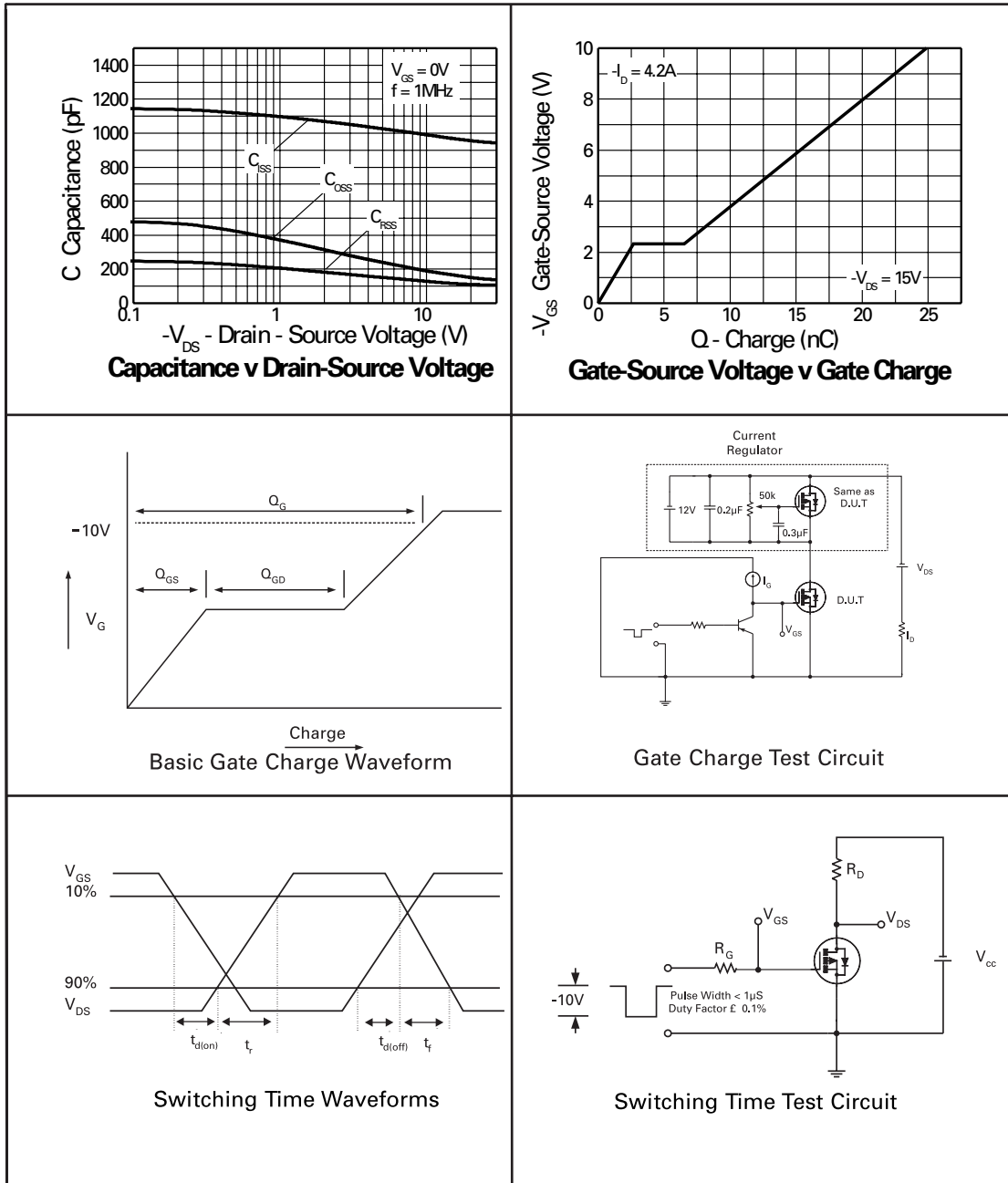
## P-CHANNEL TYPICAL CHARACTERISTICS





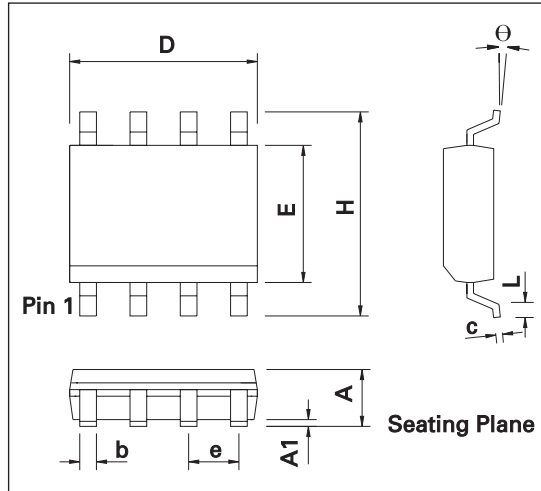
# ZXMC3A16DN8

## P-CHANNEL TYPICAL CHARACTERISTICS



# ZXMC3A16DN8

## PACKAGE OUTLINE



CONTROLLING DIMENSIONS ARE IN INCHES  
APPROX IN MILLIMETERS

## PACKAGE DIMENSIONS

| DIM | Millimeters |      | Inches |       | DIM | Millimeters |      | Inches    |       |
|-----|-------------|------|--------|-------|-----|-------------|------|-----------|-------|
|     | Min         | Max  | Min    | Max   |     | Min         | Max  | Min       | Max   |
| A   | 1.35        | 1.75 | 0.053  | 0.069 | e   | 1.27 BSC    |      | 0.050 BSC |       |
| A1  | 0.10        | 0.25 | 0.004  | 0.010 | b   | 0.33        | 0.51 | 0.013     | 0.020 |
| D   | 4.80        | 5.00 | 0.189  | 0.197 | c   | 0.19        | 0.25 | 0.008     | 0.010 |
| H   | 5.80        | 6.20 | 0.228  | 0.244 | Θ   | 0°          | 8°   | 0°        | 8°    |
| E   | 3.80        | 4.00 | 0.150  | 0.157 | h   | 0.25        | 0.50 | 0.010     | 0.020 |
| L   | 0.40        | 1.27 | 0.016  | 0.050 | -   | -           | -    | -         | -     |

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