

ZXMHC3A01T8

COMPLEMENTARY 30V ENHANCEMENT MODE MOSFET H-BRIDGE

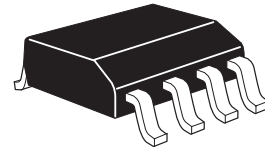
SUMMARY

N-Channel = $V_{(BR)DSS} = 30V$; $R_{DS(on)} = 0.12\Omega$; $I_D = 3.1A$

P-Channel = $V_{(BR)DSS} = -30V$; $R_{DS(on)} = 0.21\Omega$; $I_D = -2.3A$

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.



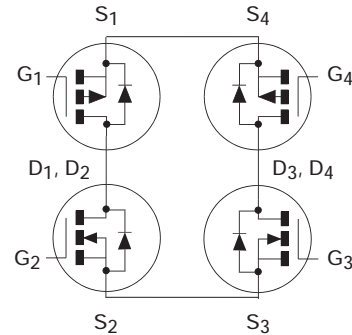
SM8

FEATURES

- Low on-resistance
- Fast switching speed
- Low threshold
- Low gate drive
- Single SM-8 surface mount package

APPLICATIONS

- Single phase DC fan motor drive



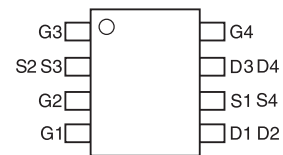
ORDERING INFORMATION

| DEVICE | REEL SIZE | TAPE WIDTH | QUANTITY PER REEL |
|---------------|-----------|------------|-------------------|
| ZXMHC3A01T8TA | 7" | 12mm | 1,000 units |
| ZXMHC3A01T8TC | 13" | 12mm | 4,000 units |

DEVICE MARKING

- ZXMH
C3A01

PINOUT



Top View

ZXMHC3A01T8

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 ($V_{GS} = 10V$; $T_A = 25^\circ C$) ^{(b)(d)} | I_D | 3.1 | -2.3 | A |
| ($V_{GS} = 10V$; $T_A = 70^\circ C$) ^{(b)(d)} | | 2.5 | -1.8 | A |
| ($V_{GS} = 10V$; $T_A = 25^\circ C$) ^{(a)(d)} | | 2.7 | -2.0 | A |
| Pulsed drain current ^(c) | I_{DM} | 14.5 | -10.8 | A |
| Continuous source current (body diode) ^(b) | I_S | 2.3 | -2.2 | A |
| Pulsed source current (body diode) ^(c) | I_{SM} | 14.5 | -10.8 | A |
| Power dissipation at $T_A = 25^\circ C$ ^{(a)(d)} | P_D | 1.3 | | W |
| Linear derating factor | | 10.4 | | mW/ $^\circ C$ |
| Power dissipation at $T_A = 25^\circ C$ ^{(b)(d)} | P_D | 1.7 | | W |
| Linear derating factor | | 13.6 | | mW/ $^\circ C$ |
| Operating and storage temperature range | T_j, T_{stg} | -55 to +150 | | $^\circ C$ |

THERMAL RESISTANCE

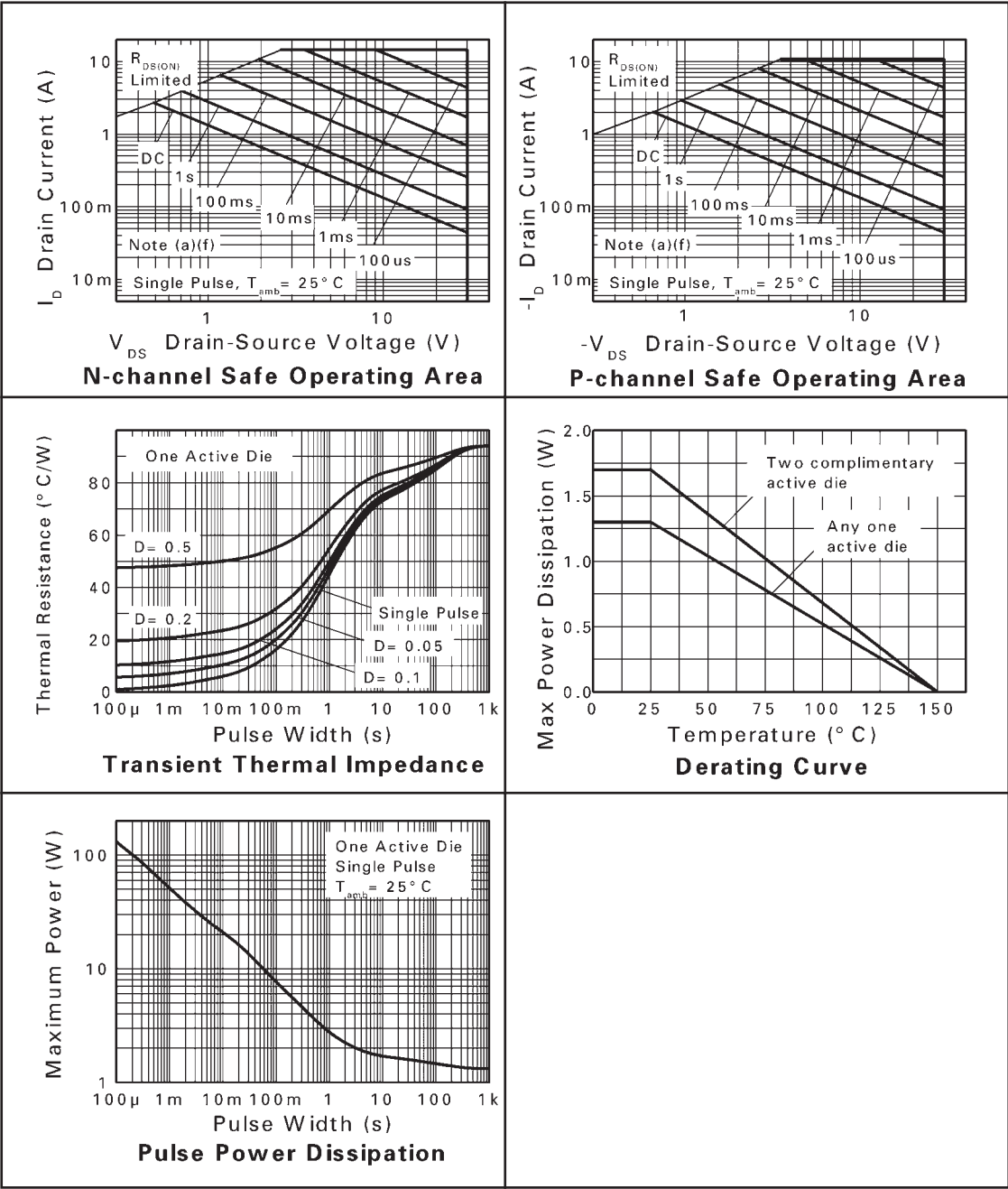
| PARAMETER | SYMBOL | VALUE | UNIT |
|---------------------------------------|-----------------|-------|--------------|
| Junction to ambient ^{(a)(d)} | $R_{\theta JA}$ | 96 | $^\circ C/W$ |
| Junction to ambient ^{(b)(d)} | $R_{\theta JA}$ | 73 | $^\circ C/W$ |

NOTES

- (a) 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.
 (b) For a device surface mounted on FR4 PCB measured at $t \leq 10$ sec.
 (c) Repetitive rating on 50mm x 50mm x 1.6mm FR4, $D = 0.02$, pulse width 300 μ S - pulse width limited by maximum junction temperature. Refer to transient thermal impedance graph.
 (d) For device with one active die.

ZXMHC3A01T8

CHARACTERISTICS



ZXMHC3A01T8

N-channel

ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ 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} | | | 1.0 | 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 ⁽¹⁾ | R _{DS(on)} | | | 0.12 | Ω | V _{GS} = 10V, I _D = 2.5A |
| | | | | 0.18 | Ω | V _{GS} = 4.5V, I _D = 2.0A |
| Forward transconductance ⁽¹⁾ ⁽³⁾ | g _{fs} | | 3.5 | | S | V _{DS} =4.5V, I _D = 2.5A |
| DYNAMIC ⁽³⁾ | | | | | | |
| 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 ⁽²⁾ ⁽³⁾ | | | | | | |
| Turn-on-delay time | t _{d(on)} | | 1.7 | | ns | V _{DD} = 15V, I _D = 2.5A R _G ≡ 6.0Ω, V _{GS} = 10V |
| Rise time | t _r | | 2.3 | | ns | |
| Turn-off delay time | t _{d(off)} | | 6.6 | | ns | |
| Fall time | t _f | | 2.9 | | ns | |
| 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 ⁽¹⁾ | V _{SD} | | | 0.95 | V | T _j =25°C, I _S = 1.7A, V _{GS} =0V |
| Reverse recovery time ⁽³⁾ | t _{rr} | | 17.7 | | ns | T _j =25°C, I _S = 2.5A, |
| Reverse recovery charge ⁽³⁾ | Q _{rr} | | 13.0 | | nC | di/dt=100A/μs |

NOTES

(1) Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.

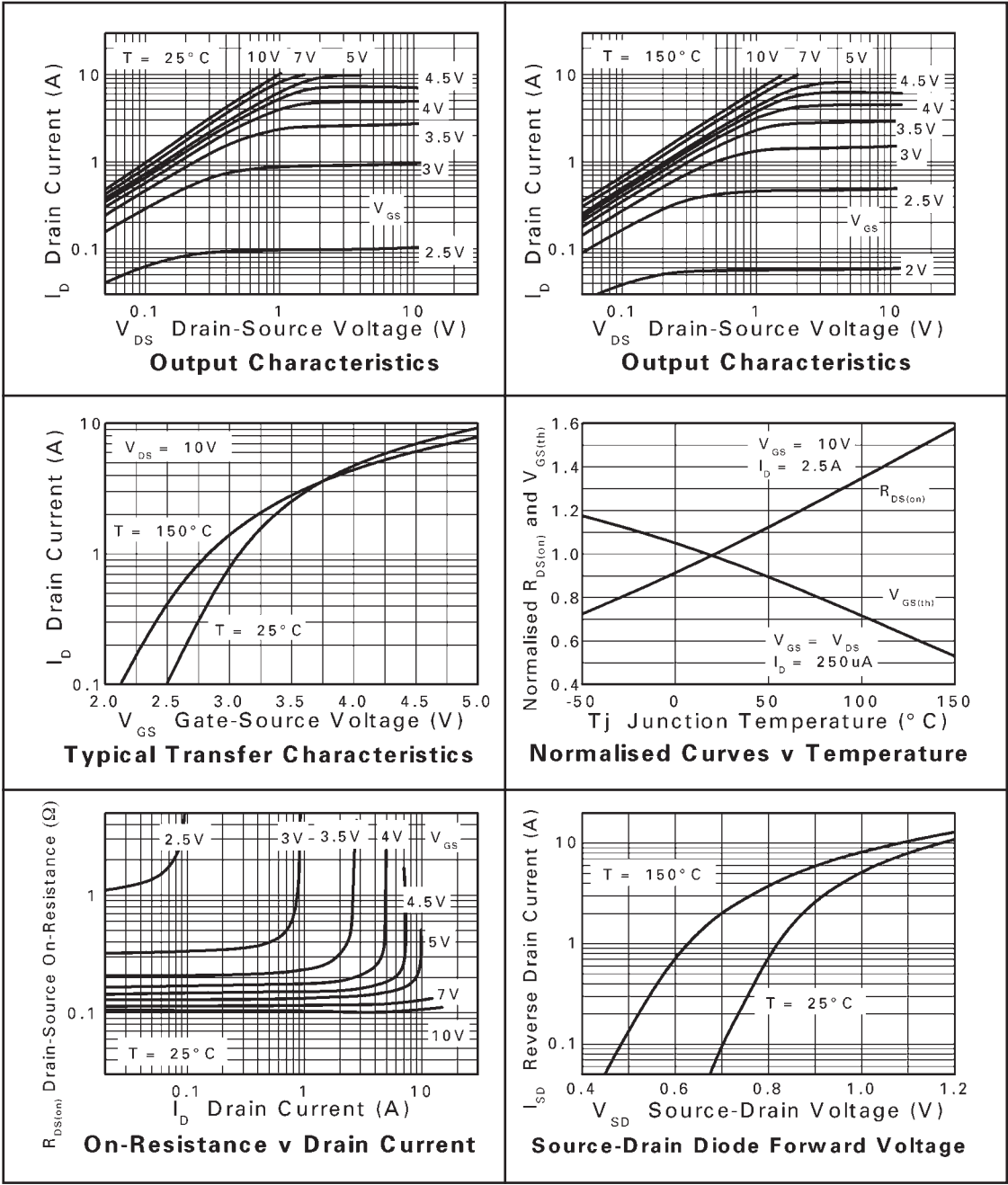
(2) Switching characteristics are independent of operating junction temperature.

(3) For design aid only, not subject to production testing.

ZXMHC3A01T8

N-channel

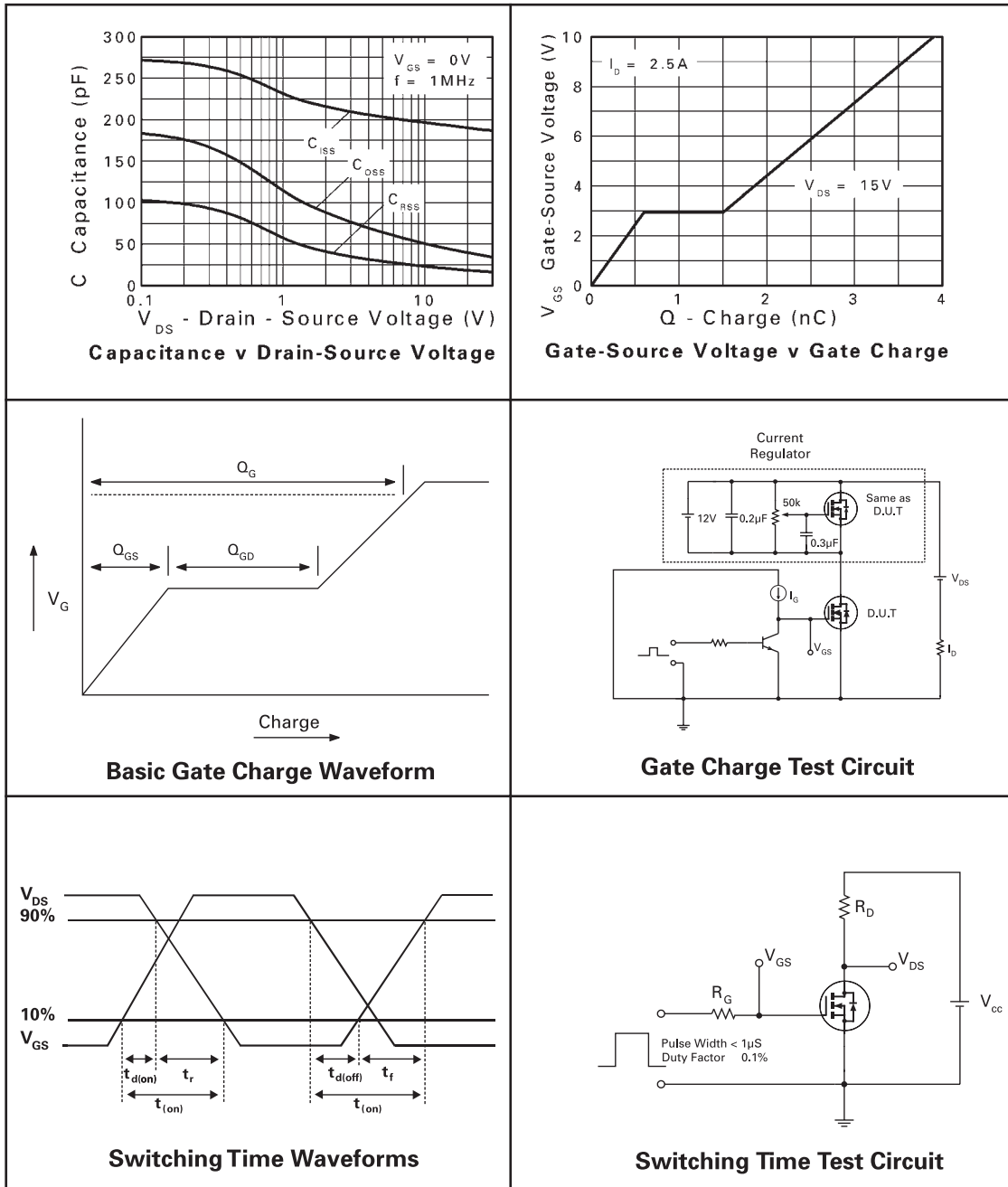
TYPICAL CHARACTERISTICS



ZXMHC3A01T8

N-channel

TYPICAL CHARACTERISTICS



ZXMHC3A01T8

P-channel

ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ 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} | | | -1.0 | 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 ⁽¹⁾ | R _{DS(on)} | | | 0.21 | Ω | V _{GS} = -10V, I _D = -1.4A |
| | | | | 0.33 | Ω | V _{GS} = -4.5V, I _D = -1.1A |
| Forward transconductance ⁽¹⁾ ⁽³⁾ | g _{fs} | | 2.5 | | S | V _{DS} = -15V, I _D = -1.4A |
| DYNAMIC ⁽³⁾ | | | | | | |
| 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 ⁽²⁾ ⁽³⁾ | | | | | | |
| Turn-on-delay time | t _{d(on)} | | 1.2 | | ns | V _{DD} = -15V, I _D = -1A R _G ≡ 6.0Ω, V _{GS} = -10V |
| Rise time | t _r | | 2.3 | | ns | |
| Turn-off delay time | t _{d(off)} | | 12.1 | | ns | |
| Fall time | t _f | | 7.5 | | ns | |
| Total gate charge | | | 2.6 | | nC | V _{DS} = -15V, V _{GS} = -5V I _D = -1.4A |
| 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 ⁽¹⁾ | V _{SD} | | -0.85 | -0.95 | V | T _J =25°C, I _S = -1.1A, V _{GS} =0V |
| Reverse recovery time ⁽³⁾ | t _{rr} | | 19 | | ns | T _J =25°C, I _S = -0.95A, |
| Reverse recovery charge ⁽³⁾ | Q _{rr} | | 15 | | nC | di/dt=100A/μs |

NOTES

(1) Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.

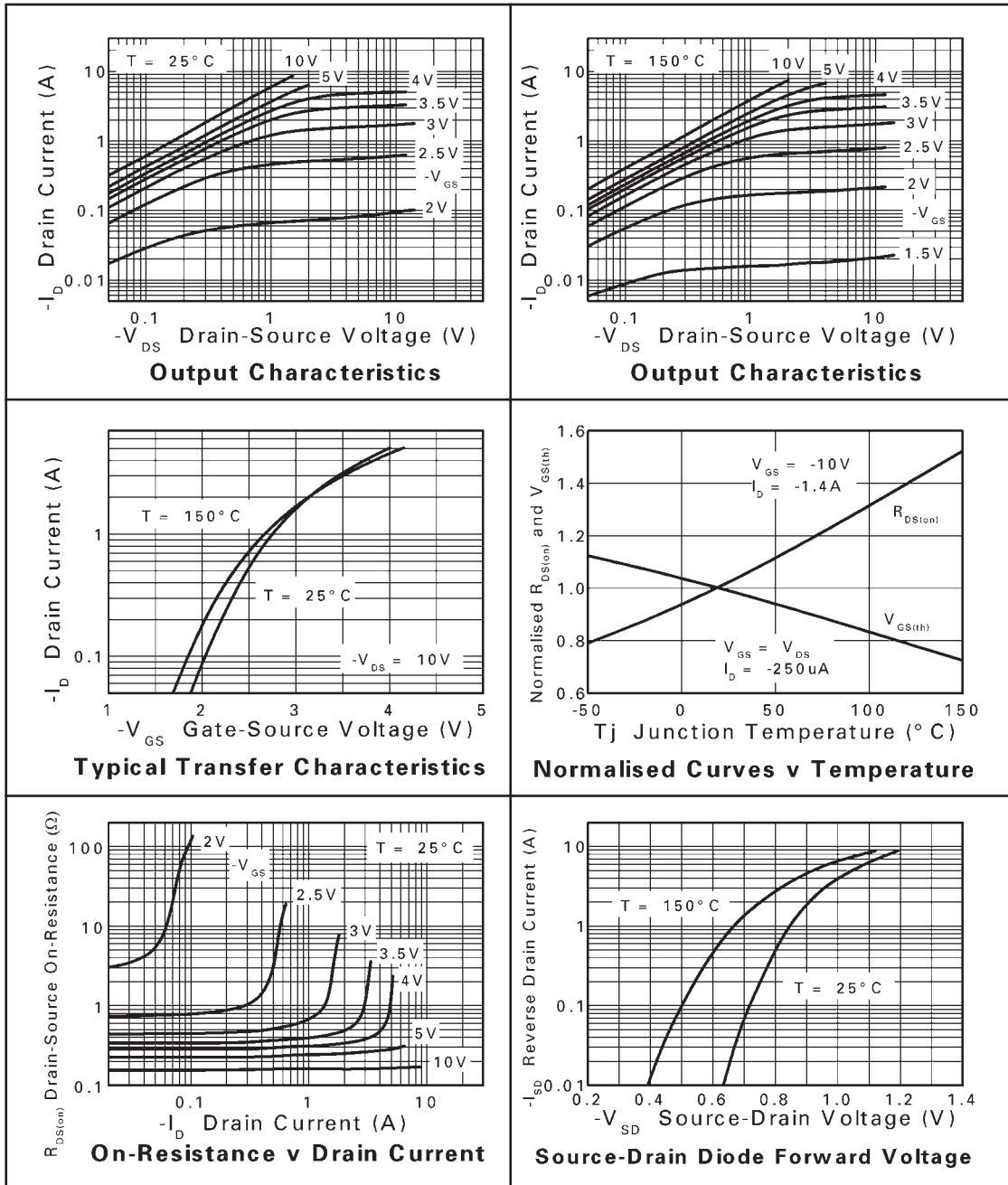
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ZXMHC3A01T8

P-channel

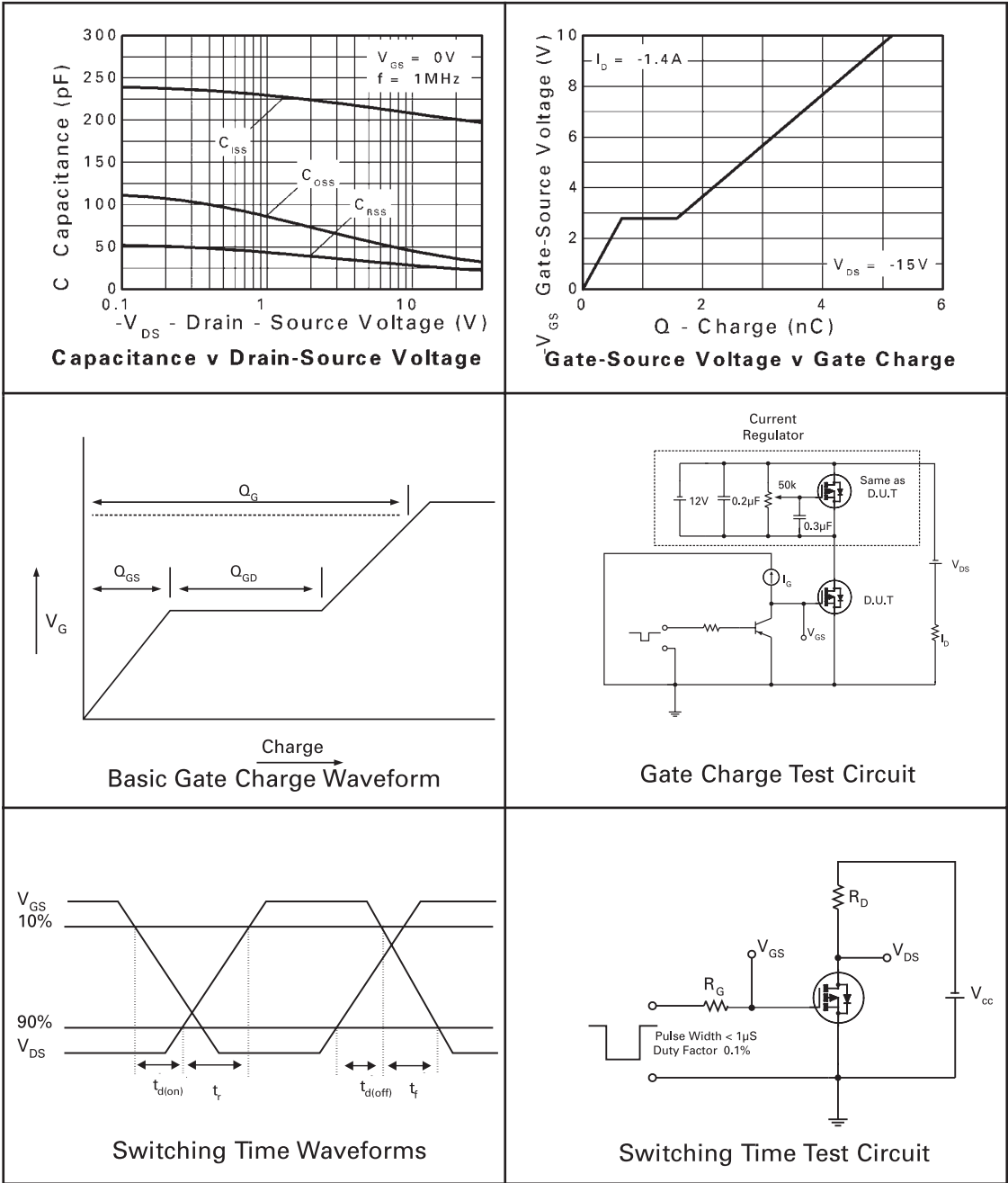
TYPICAL CHARACTERISTICS



ZXMHC3A01T8

P-channel

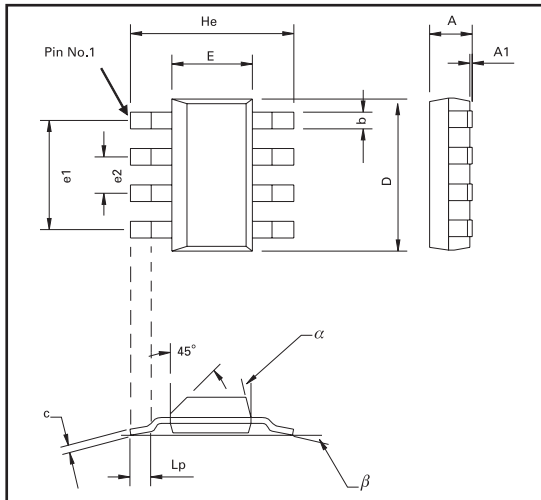
TYPICAL CHARACTERISTICS



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PACKAGE OUTLINE



Controlling dimensions are in millimeters. Approximate conversions are given in inches

PACKAGE DIMENSIONS

| DIM | Millimeters | | | Inches | | | DIM | Millimeters | | | Inches | | |
|-----|-------------|------|------|--------|-------|--------|-------|-------------|-----|------|--------|-------|--------|
| | Min | Max | Typ. | Min | Max | Typ. | | Min | Max | Typ. | Min | Max | Typ. |
| A | - | 1.7 | - | - | 0.067 | - | e1 | - | - | 4.59 | - | - | 0.1807 |
| A1 | 0.02 | 0.1 | - | 0.008 | 0.004 | - | e2 | - | - | 1.53 | - | - | 0.0602 |
| b | - | - | 0.7 | - | - | 0.0275 | He | 6.7 | 7.3 | - | 0.264 | 0.287 | - |
| c | 0.24 | 0.32 | - | 0.009 | 0.013 | - | Lp | 0.9 | - | - | 0.035 | - | - |
| D | 6.3 | 6.7 | - | 0.248 | 0.264 | - | alpha | - | 15° | - | - | 15° | - |
| E | 3.3 | 3.7 | - | 0.130 | 0.145 | - | beta | - | - | 10° | - | - | 10° |

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