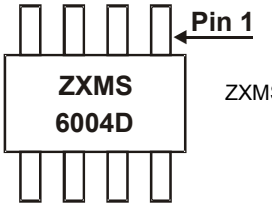
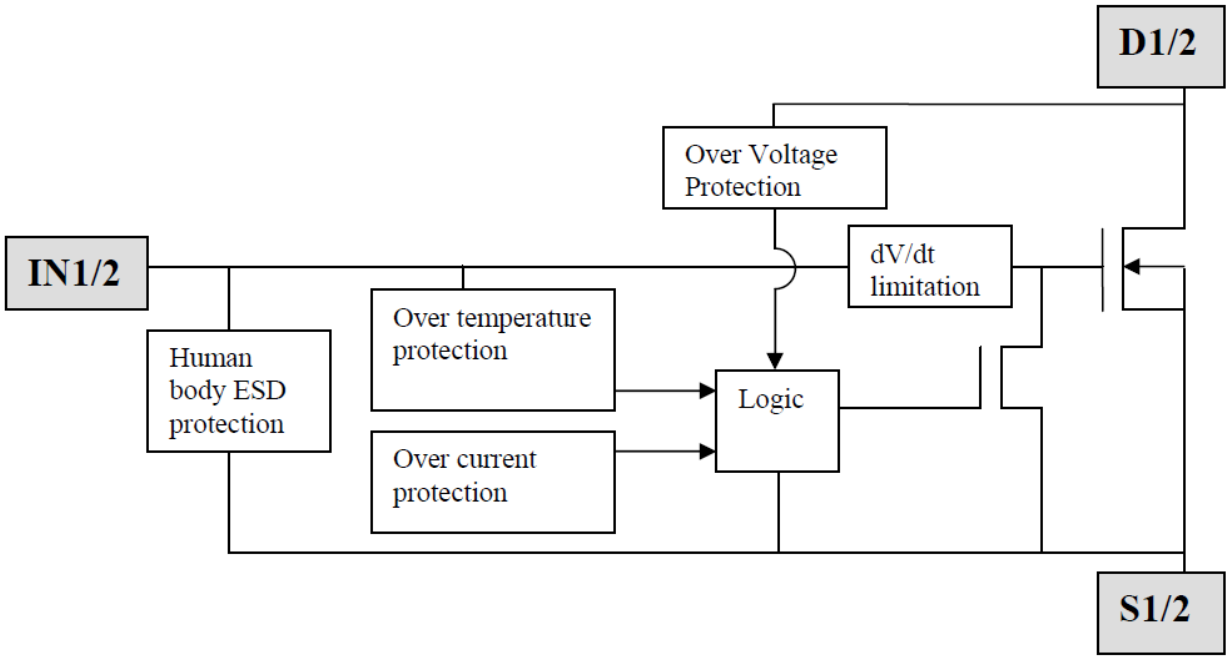
Marking Information



ZXMS6004D = Product Type Marking Code

Functional Block Diagram



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Absolute Maximum Ratings (@T_{amb} = +25°C, unless otherwise stated.)

Characteristic	Symbol	Value	Units
Continuous Drain-Source Voltage	V_{DS}	60	V
Drain-Source Voltage For Short Circuit Protection	$V_{DS(SC)}$	36	V
Continuous Input Voltage	V_{IN}	-0.5 ... +6	V
Continuous Input Current @ -0.2V ≤ V_{IN} ≤ 6V Continuous Input Current @V_{IN} < -0.2V or V_{IN} > 6V	I_{IN}	No limit $\lvert I_{IN} \rvert$ ≤2	mA
Pulsed Drain Current @V_{IN} = 3.3V (Note 8)	I_{DM}	2	A
Pulsed Drain Current @V_{IN} = 5V (Note 8)	I_{DM}	2.5	A
Continuous Source Current (Body Diode) (Note 6)	I_S	1	A
Pulsed Source Current (Body Diode) (Note 8)	I_{SM}	5	A
Unclamped Single Pulse Inductive Energy, T_J = +25°C, I_D = 0.5A, V_{DD} = 24V	E_{AS}	210	mJ
Electrostatic Discharge (Human Body Model)	V_{ESD}	4000	V
Charged Device Model	V_{CDM}	1000	V

Thermal Resistance

Characteristic	Symbol	Value	Units
Power Dissipation at T_{amb} = +25°C (Notes 6 & 9) Linear Derating Factor	P_D	1.16 9.28	W mW/°C
Power Dissipation at T_{amb} = +25°C (Notes 6 & 10) Linear Derating Factor	P_D	1.67 13.3	W mW/°C
Power Dissipation at T_{amb} = +25°C (Notes 7 & 9) Linear Derating Factor	P_D	2.13 17	W mW/°C
Thermal Resistance, Junction to Ambient (Notes 6 & 9)	$R_{\theta JA}$	108	°C/W
Thermal Resistance, Junction to Ambient (Notes 6 & 10)	$R_{\theta JA}$	75	°C/W
Thermal Resistance, Junction to Case (Notes 7 & 9)	$R_{\theta JC}$	58.7	°C/W
Thermal Resistance, Junction to Case (Note 11)	$R_{\theta JC}$	26.5	°C/W
Operating Temperature Range	T_J	-40 to +150	°C
Storage Temperature Range	T_{STG}	-55 to +150	°C

Notes:
6. For a dual device surface mounted on a 25mm x 25mm FR4 PCB single sided 1oz weight copper split down the middle on 1.6mm FR4 board, in still air conditions
7. For a dual device surface mounted on FR4 PCB measured at t ≤ 10sec
8. Repetitive rating 25mm x 25mm FR4 PCB, D = 0.02 pulse width = 300µs – pulse width limited by junction temperature. Refer to transient Thermal Impedance Graph
9. For a dual device with one active die
10. For dual device with 2 active die running at equal power
11. Thermal resistance from junction to solder-point (at the end of the drain lead)

Recommended Operating Conditions

The ZXMS6004DT8Q is optimized for use with µC operating from 3.3V and 5V supplies.

Characteristic	Symbol	Min	Max	Unit
Input Voltage Range	V_{IN}	0	5.5	V
Ambient Temperature Range	T_A	-40	125	°C
High Level Input Voltage for MOSFET to be on	V_{IH}	3	5.5	V
Low Level Input Voltage for MOSFET to be off	V_{IL}	0	0.7	V
Peripheral Supply Voltage (Voltage to Which Load is Referred)	V_P	0	36	V

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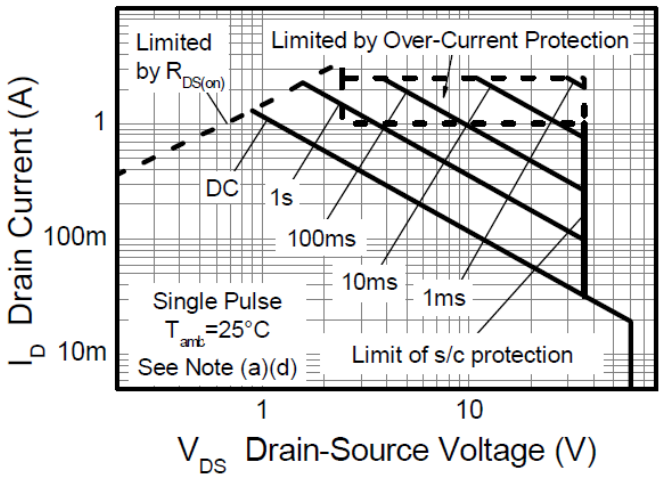
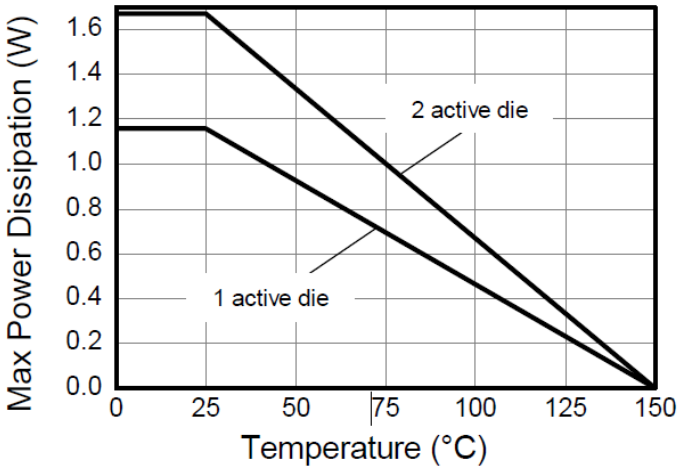
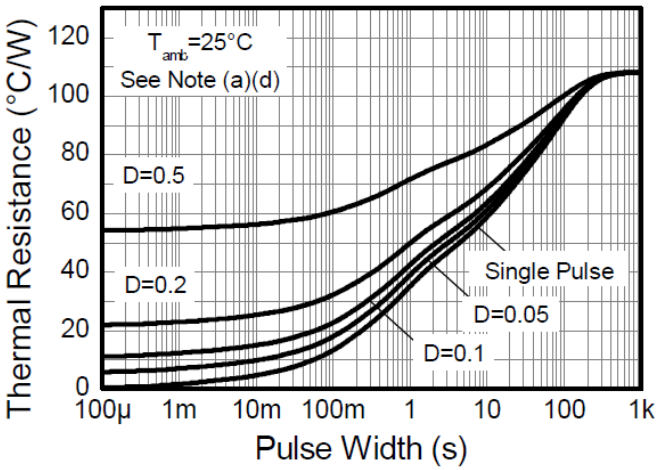
Thermal Characteristics



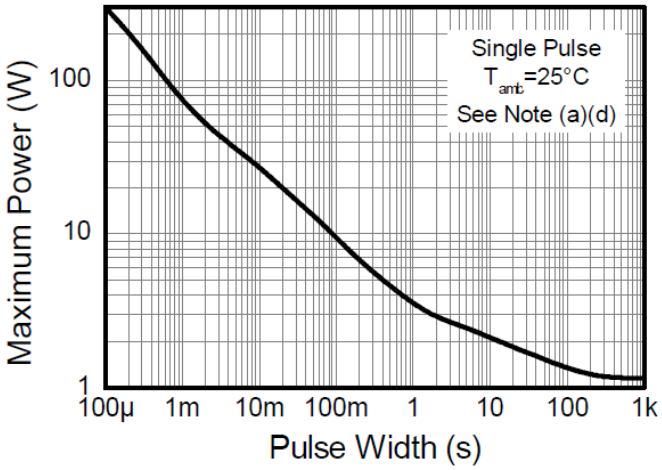
Safe Operating Area



Derating Curve



Transient Thermal Impedance



Pulse Power Dissipation

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Electrical Characteristics (@T_{amb} = +25°C, unless otherwise stated.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Static Characteristics						
Drain-Source Clamp Voltage	$V_{DS(AZ)}$	60	65	70	V	I_D = 10mA
Off State Drain Current	I_{DSS}	—	—	0.5	μA	V_{DS} = 12V, V_{IN} = 0V
		—	—	1		V_{DS} = 36V, V_{IN} = 0V
Input Threshold Voltage	$V_{IN(th)}$	0.7	1	1.5	V	V_{DS} = V_{GS}, I_D = 1mA
Input Current	I_{IN}	—	60	100	μA	V_{IN} = +3V
		—	120	200		V_{IN} = +5V
Input Current while Over Temperature Active	—	—	—	220	μA	V_{IN} = +5V
Static Drain-Source On-State Resistance	$R_{DS(on)}$	—	400	600	mΩ	V_{IN} = +3V, I_D = 1A
		—	350	500		V_{IN} = +5V, I_D = 1A
Continuous Drain Current (Notes 6 & 10)	I_D	0.9	—	—	A	V_{IN} = 3V; T_A = +25°C
		1	—	—		V_{IN} = 5V; T_A = +25°C
Continuous Drain Current (Notes 6 & 9)		1.1	—	—		V_{IN} = 3V; T_A = +25°C
		1.2	—	—		V_{IN} = 5V; T_A = +25°C
Current Limit (Note 12)	$I_{D(LIM)}$	0.7	1.7	—	A	V_{IN} = +3V
		1	2.2	—		V_{IN} = +5V
Dynamic Characteristics						
Turn On Delay Time	$t_{d(on)}$	—	5	—	μs	V_{DD} = 12V, I_D = 0.5A, V_{GS} = 5V
Rise Time	t_r	—	10	—	μs	
Turn Off Delay Time	$t_{d(off)}$	—	45	—	μs	
Fall Time	f_f	—	15	—	μs	
Over-Temperature Protection						
Thermal Overload Trip Temperature (Note 13)	T_{JT}	150	175	—	°C	—
Thermal Hysteresis (Note 13)	—	—	10	—	°C	—

Notes: 12. The drain current is restricted only when the device is in saturation (see graph "Typical Output Characteristic"). This allows the device to be used in the fully on state without interference from the current limit. The device is fully protected at all drain currents, as the low power dissipation generated outside saturation makes current limit unnecessary.

13. Over-temperature protection is designed to prevent device destruction under fault conditions. Fault conditions are considered as "outside" normal operating range, so this part is not designed to withstand over-temperature for extended periods.

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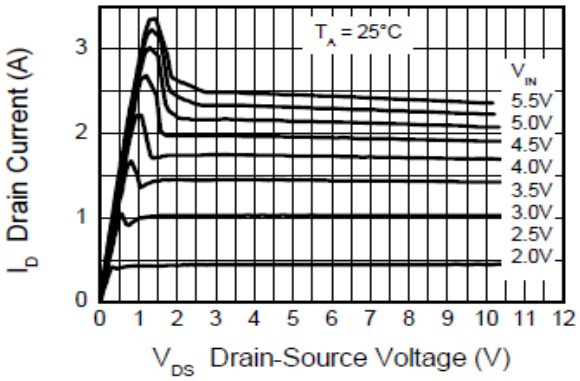
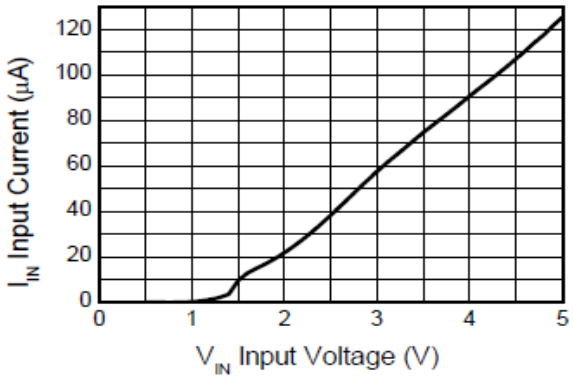
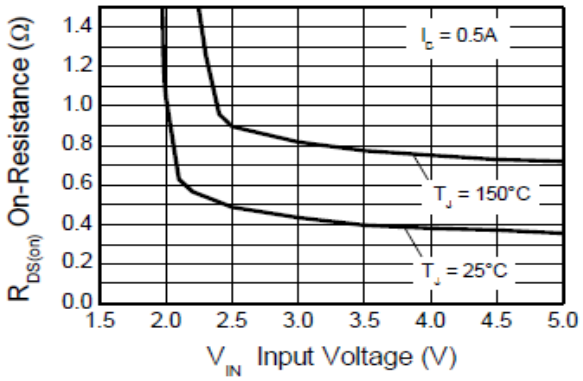
Typical Characteristics



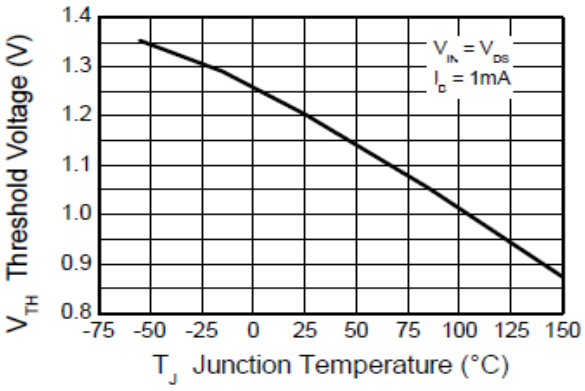
Typical Output Characteristic



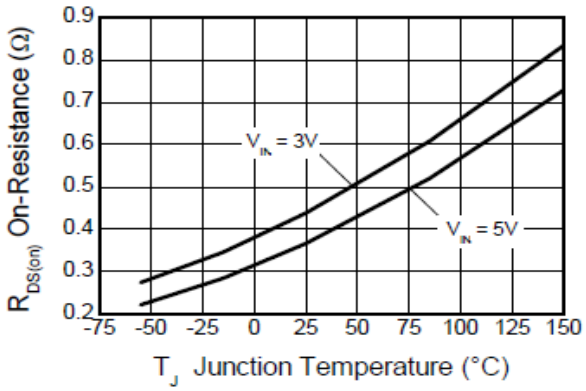
Input Current vs Input Voltage



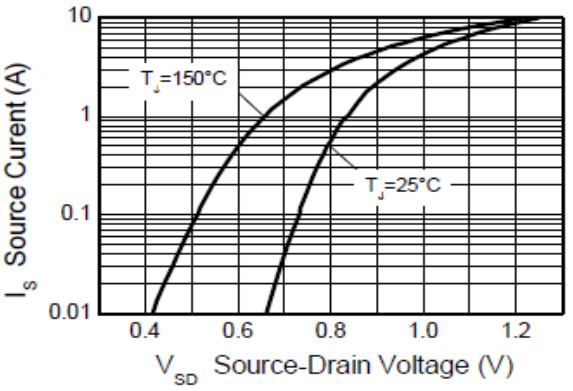
On-Resistance vs Input Voltage



Threshold Voltage vs Temperature



On-Resistance vs Temperature



Reverse Diode Characteristic

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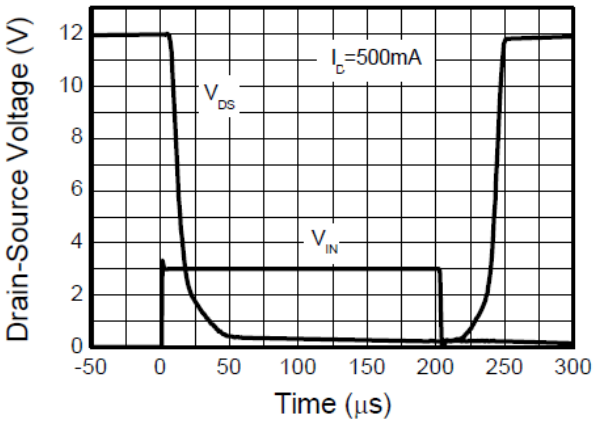
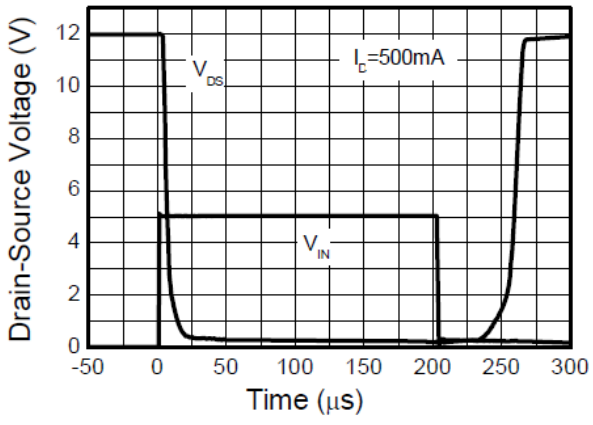
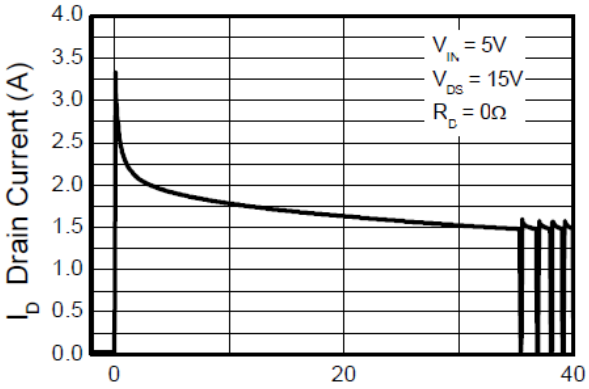
Typical Characteristics – (cont.)



Switching Speed



Switching Speed



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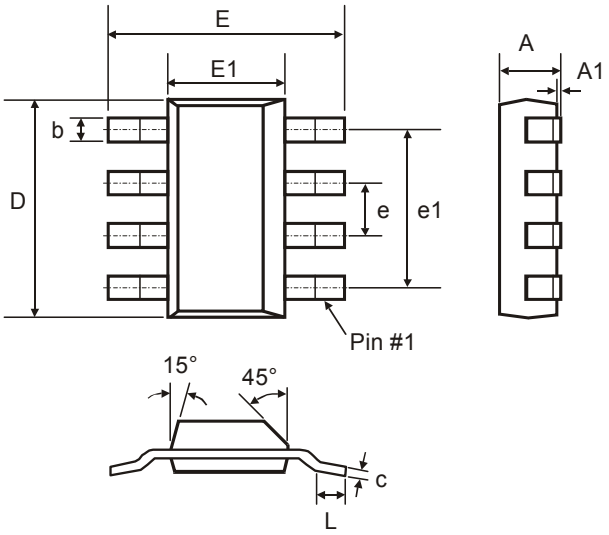
Package Outline Dimensions

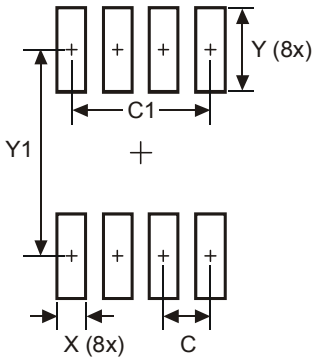
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



SM-8			
Dim	**Min**	**Max**	**Typ**
A	–	1.7	–
A1	0.02	0.1	–
b	–	0.7	–
c	0.24	0.32	–
D	6.3	6.7	–
e	–	–	1.53
e1	–	–	4.59
E	6.7	7.3	–
E1	3.3	3.7	–
L	0.9	–	–
All Dimensions in mm			

Suggested Pad Layout

Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.



Dimensions	Value (in mm)
C	1.52
C1	4.6
X	0.95
Y	2.80
Y1	6.80

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