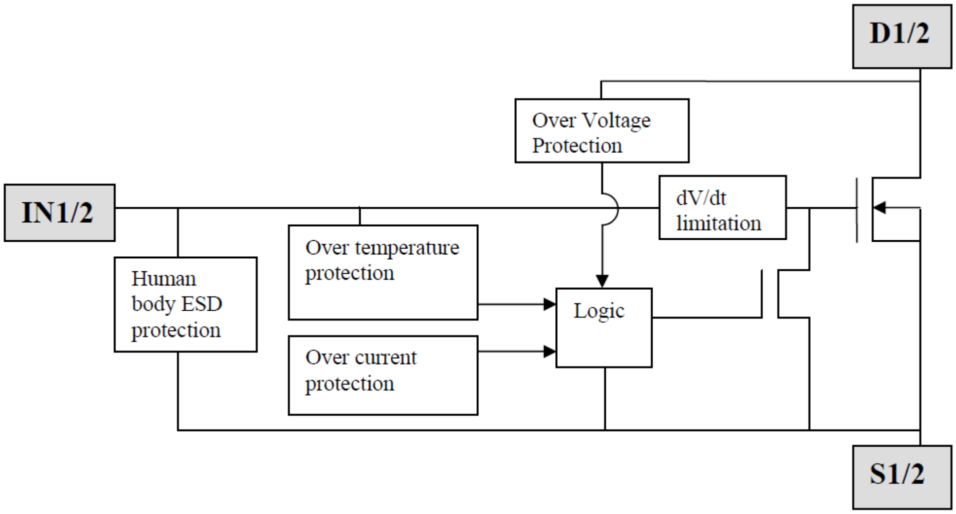
Functional Block Diagram



Application Information

- Two completely isolated independent channels
- Especially suited for loads with a high in-rush current such as lamps and motors
- All types of resistive, inductive and capacitive loads in switching applications
- µC compatible power switch for 12V DC applications
- Automotive rated
- Replaces electromechanical relays and discrete circuits
- Linear Mode Capability - the current-limiting protection circuitry is designed to de-activate at low V_{DS} to minimise on state power dissipation. The maximum DC operating current is therefore determined by the thermal capability of the package/board combination, rather than by the protection circuitry. This does not compromise the product's ability to self-protect at low V_{DS}

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Units
Continuous Drain-Source Voltage	V_{DS}	60	V
Drain-Source Voltage For Short Circuit Protection	$V_{DS(SC)}$	24	V
Continuous Input Voltage	V_{IN}	-0.5 to +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 $\lvert I_{IN} \rvert \leq 2$	mA
Pulsed Drain Current @V_{IN} = 3.3V (Note 7)	I_{DM}	5	A
Pulsed Drain Current @V_{IN} = 5V (Note 7)	I_{DM}	6	A
Continuous Source Current (Body Diode) (Note 5)	I_S	2.5	A
Pulsed Source Current (Body Diode)	I_{SM}	10	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

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Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Units
Power Dissipation at T_A = +25°C (Notes 5 & 8) Linear Derating Factor	P_D	1.16 9.28	W mW/°C
Power Dissipation at T_A = +25°C (Notes 5 & 9) Linear Derating Factor	P_D	1.67 13.3	W mW/°C
Power Dissipation at T_A = +25°C (Notes 6 & 8) Linear Derating Factor	P_D	2.13 17	W mW/°C
Thermal Resistance, Junction to Ambient (Notes 5 & 8)	$R_{\theta JA}$	108	°C/W
Thermal Resistance, Junction to Ambient (Notes 5 & 9)	$R_{\theta JA}$	75	°C/W
Thermal Resistance, Junction to Case (Notes 6 & 8)	$R_{\theta JC}$	58.7	°C/W
Thermal Resistance, Junction to Case (Note 10)	$R_{\theta JC}$	26.5	°C/W
Operating Temperature Range	T_J	-40 to +150	°C
Storage Temperature Range	T_{STG}	-55 to +150	°C

Notes:

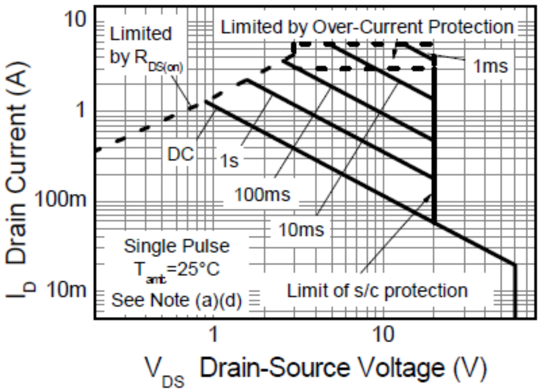
5. For a dual device surface mounted on a 25mm x 25mm single sided 1oz weight copper split down the middle on 1.6mm FR4 board, in still air conditions.
6. For a dual device surface mounted on FR4 PCB measured at t ≤ 10sec.
7. Repetitive rating25mm x 25mm FR4 PCB, D = 0.02, Pulse width = 300µs – pulse width limited by junction temperature. Refer to transient thermal impedance graph.
8. For a dual device with one active die.
9. For a dual device with 2 active die running at equal power.
10. Thermal resistance from junction to the mounting surface of the drain pin.

Recommended Operating Conditions

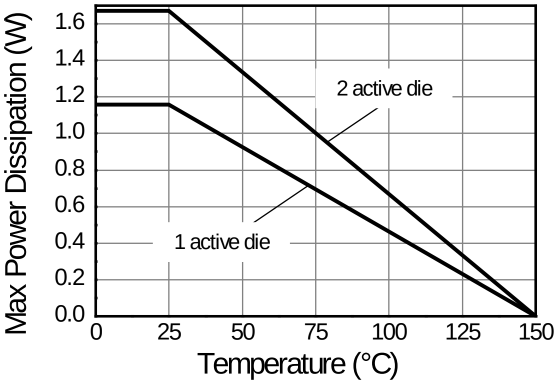
The ZXMS6005DT8 is optimized for use with µC operating from 3.3V and 5V supplies.

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	24	V

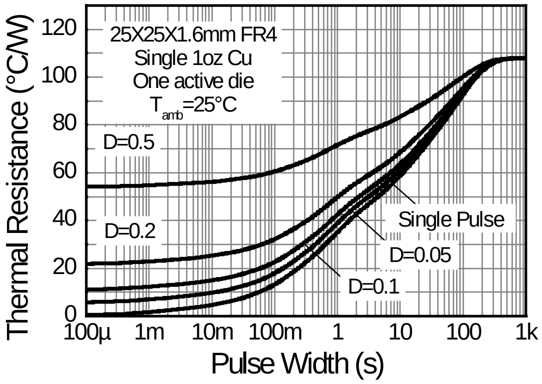
Thermal Characteristics



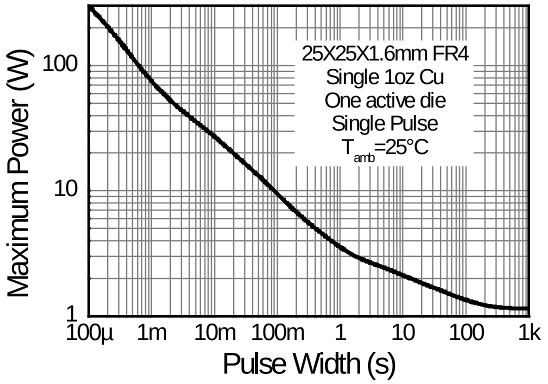
Safe Operating Area



Derating Curve



Transient Thermal Impedance



Pulse Power Dissipation

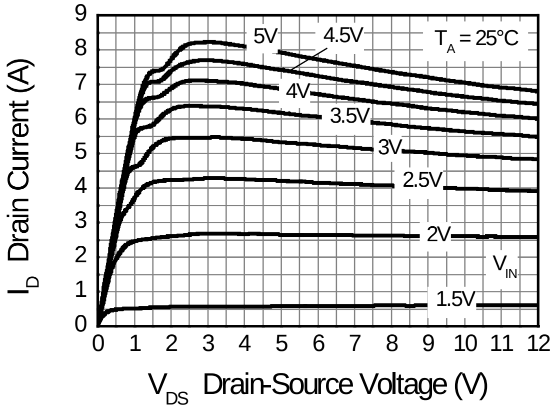
Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

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}	—	—	1	µA	V_{DS} = 12V, V_{IN} = 0V
		—	—	2		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	—	—	—	300	µA	V_{IN} = +5V
Static Drain-Source On-State Resistance	$R_{DS(on)}$	—	170	250	mΩ	V_{IN} = +3V, I_D = 1A
		—	150	200		V_{IN} = +5V, I_D = 1A
Continuous Drain Current (Notes 5 & 9)	I_D	1.4	—	—	A	V_{IN} = 3V; T_A = +25°C
		1.6	—	—		V_{IN} = 5V; T_A = +25°C
Continuous Drain Current (Notes 5 & 8)		1.7	—	—		V_{IN} = 3V; T_A = +25°C
		1.8	—	—		V_{IN} = 5V; T_A = +25°C
Current Limit (Note 11)	$I_{D(LIM)}$	2.2	5	—	A	V_{IN} = +3V
		3.3	7	—		V_{IN} = +5V
Dynamic Characteristics						
Turn On Delay Time	$t_{d(on)}$	—	6	—	µs	V_{DD} = 12V, I_D = 1A, V_{GS} = 5V
Rise Time	t_r	—	14	—	µs	
Turn Off Delay Time	$t_{d(off)}$	—	34	—	µs	
Fall Time	t_f	—	19	—	µs	
Over-Temperature Protection						
Thermal Overload Trip Temperature (Note 12)	T_{JT}	150	175	—	°C	—
Thermal Hysteresis (Note 12)	t_f	—	10	—	°C	—

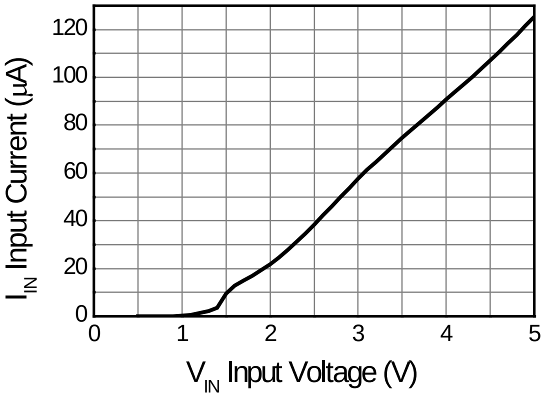
Notes:

11. 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.
12. 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.

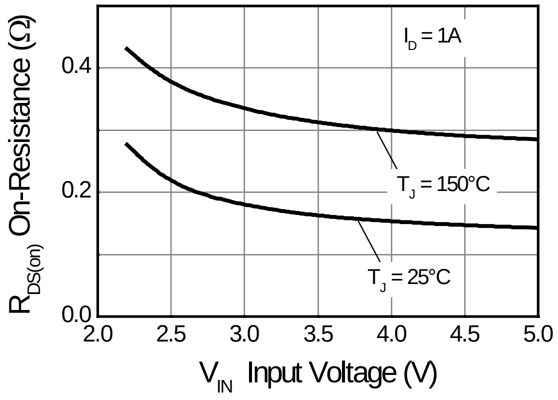
Typical Characteristics



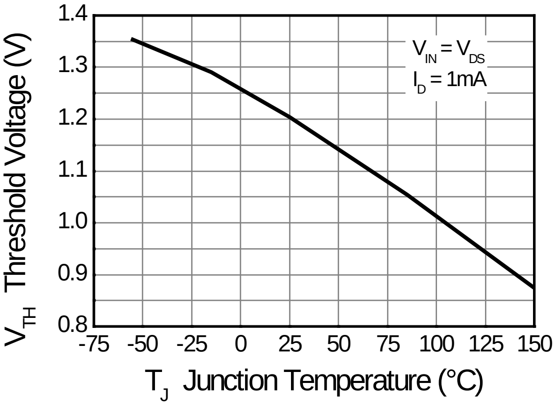
Typical Output Characteristic



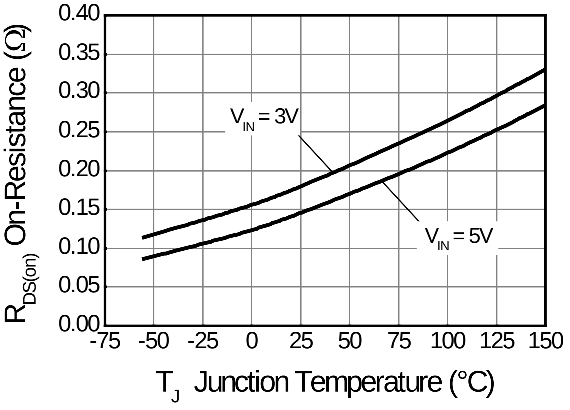
Input Current vs Input Voltage



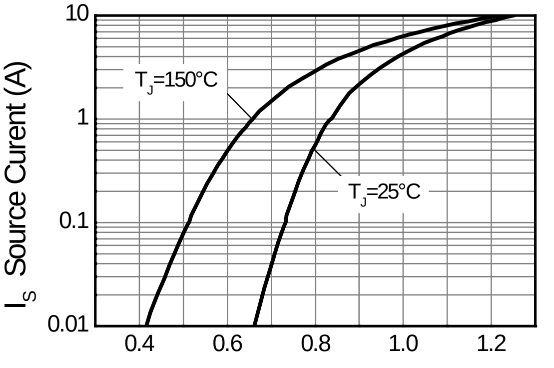
On-Resistance vs Input Voltage



Threshold Voltage vs Temperature

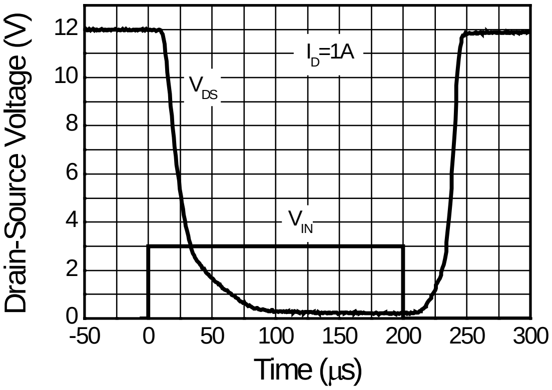


On-Resistance vs Temperature

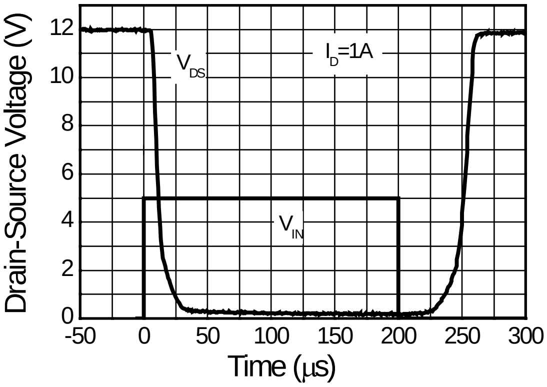


Reverse Diode Characteristic

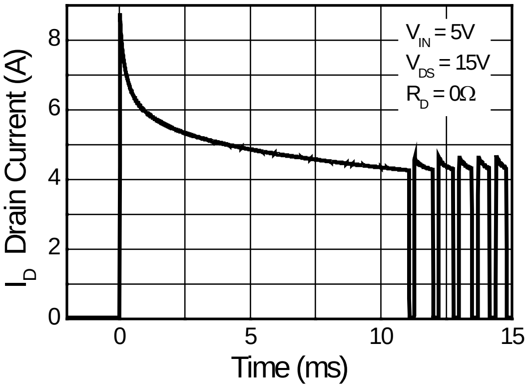
Typical Characteristics (cont.)



Switching Speed



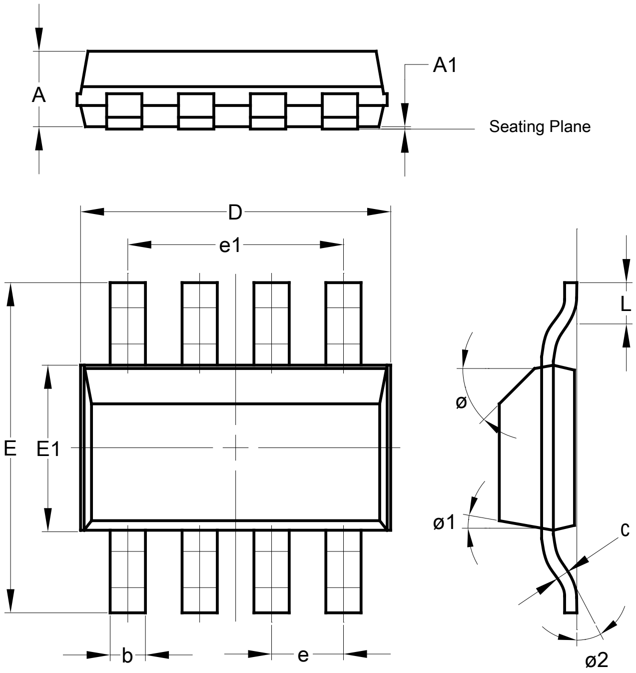
Switching Speed



Typical Short Circuit Protection

Package Outline Dimensions

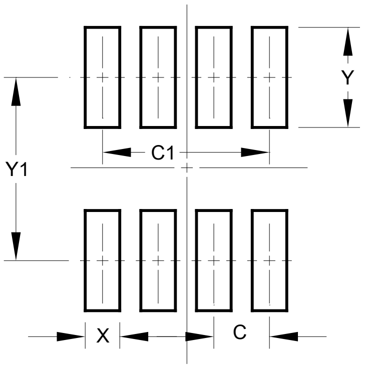
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



SM-8			
Dim	**Min**	**Max**	**Typ**
A	--	1.70	1.60
A1	0.02	0.10	0.04
b	0.70	0.90	0.80
c	0.24	0.32	0.28
D	6.30	6.70	6.60
e	1.53 REF		
e1	4.59 REF		
E	6.70	7.30	7.00
E1	3.30	3.70	3.50
L	0.75	1.00	0.90
Ø	--	--	45°
Ø1	--	15°	--
Ø2	--	--	10°
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	4.60
X	0.95
Y	2.80
Y1	6.80

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