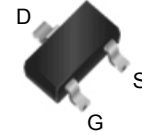
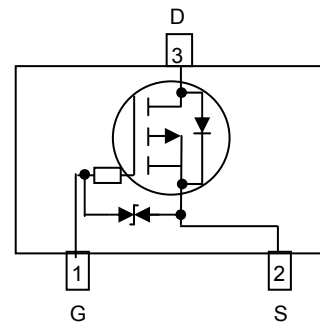
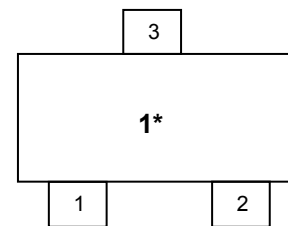


**WPM2031**
**Single P-Channel, -20V, -0.65A, Power MOSFET**
[Http://www.sh-willsemi.com](http://www.sh-willsemi.com)

V <sub>DS</sub> (V)	R <sub>ds(on)</sub> (Ω)
-20	0.495@ V <sub>GS</sub> = - 4.5V
	0.665@ V <sub>GS</sub> = - 2.5V
	0.882@ V <sub>GS</sub> = - 1.8V
ESD Protected	


**SOT-723**

**Pin configuration (Top view)**


1 =Device Code  
 \* = Month(A~Z)

**Marking**
**Descriptions**

The WPM2031 is P-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent R<sub>DS(ON)</sub> with low gate charge. This device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product WPM2031 is Pb-free and Halogen-free.

**Features**

- Trench Technology
- Supper high density cell design
- Excellent ON resistance for higher DC current
- Extremely Low Threshold Voltage
- Small package SOT-723

**Applications**

- Driver for Relay, Solenoid, Motor, LED etc.
- DC-DC converter circuit
- Power Switch
- Load Switch
- Charging

**Order information**

Device	Package	Shipping
WPM2031-3/TR	SOT-723	8000/Reel&Tape

**Absolute Maximum ratings**

Parameter		Symbol	10 S	Steady State	Unit
Drain-Source Voltage		$V_{DS}$	-20		V
Gate-Source Voltage		$V_{GS}$	$\pm 5$		
Continuous Drain Current <sup>a</sup>	$T_A=25^\circ\text{C}$	$I_D$	-0.65	-0.60	A
	$T_A=70^\circ\text{C}$		-0.52	-0.48	
Maximum Power Dissipation <sup>a</sup>	$T_A=25^\circ\text{C}$	$P_D$	0.42	0.36	W
	$T_A=70^\circ\text{C}$		0.27	0.23	
Continuous Drain Current <sup>b</sup>	$T_A=25^\circ\text{C}$	$I_D$	-0.55	-0.51	A
	$T_A=70^\circ\text{C}$		-0.44	-0.41	
Maximum Power Dissipation <sup>b</sup>	$T_A=25^\circ\text{C}$	$P_D$	0.30	0.26	W
	$T_A=70^\circ\text{C}$		0.19	0.17	
Pulsed Drain Current <sup>c</sup>		$I_{DM}$	-1.0		A
Operating Junction Temperature		$T_J$	150		$^\circ\text{C}$
Lead Temperature		$T_L$	260		$^\circ\text{C}$
Storage Temperature Range		$T_{stg}$	-55 to 150		$^\circ\text{C}$

**Thermal resistance ratings**

Parameter		Symbol	Typical	Maximum	Unit
Junction-to-Ambient Thermal Resistance <sup>a</sup>	$t \leq 10 \text{ s}$	$R_{\theta JA}$	280	340	$^\circ\text{C/W}$
	Steady State		345	410	
Junction-to-Ambient Thermal Resistance <sup>b</sup>	$t \leq 10 \text{ s}$	$R_{\theta JA}$	400	470	
	Steady State		245	280	
Junction-to-Case Thermal Resistance		$R_{\theta JC}$	280	340	

a Surface mounted on FR-4 Board using 1 square inch pad size, 1oz copper

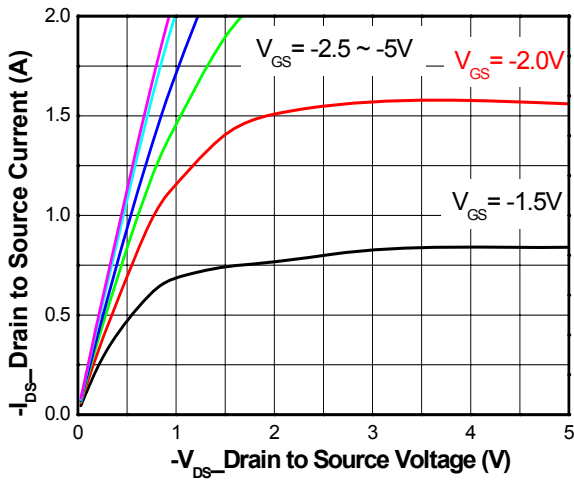
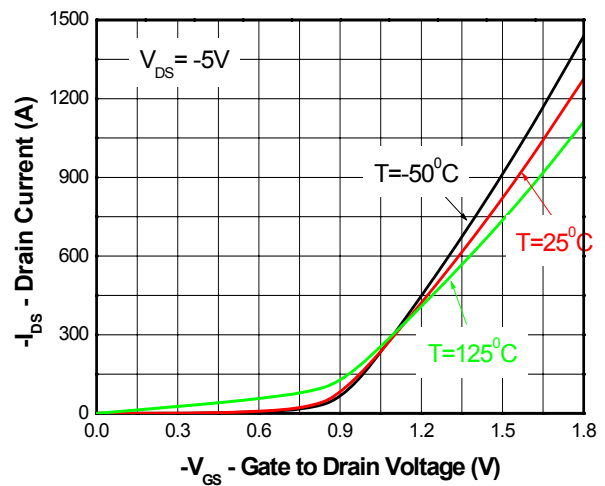
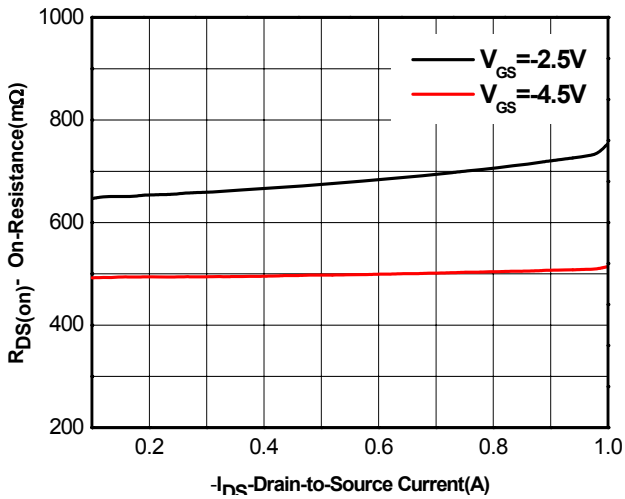
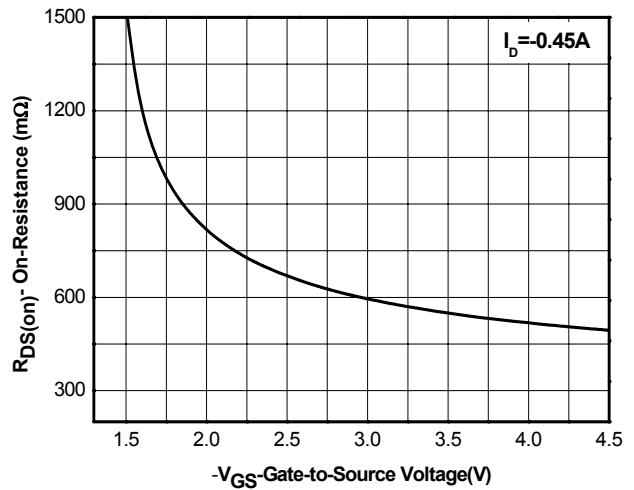
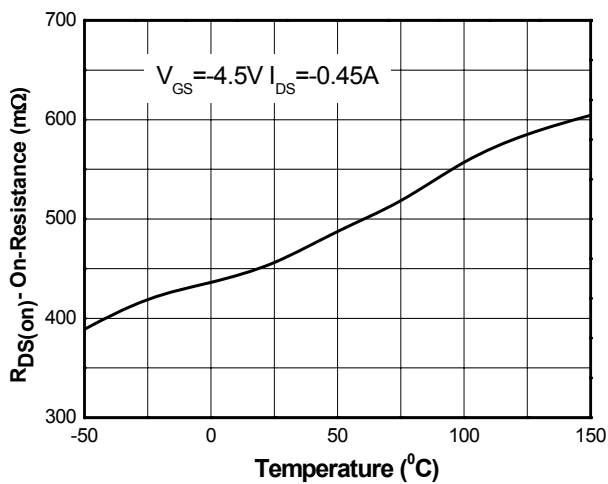
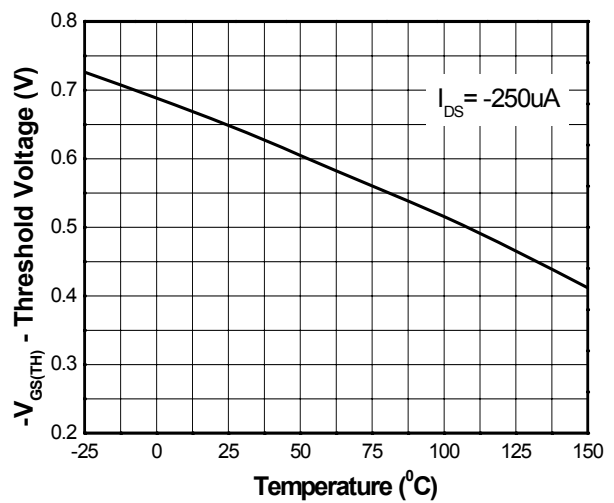
b Surface mounted on FR-4 board using minimum pad size, 1oz copper

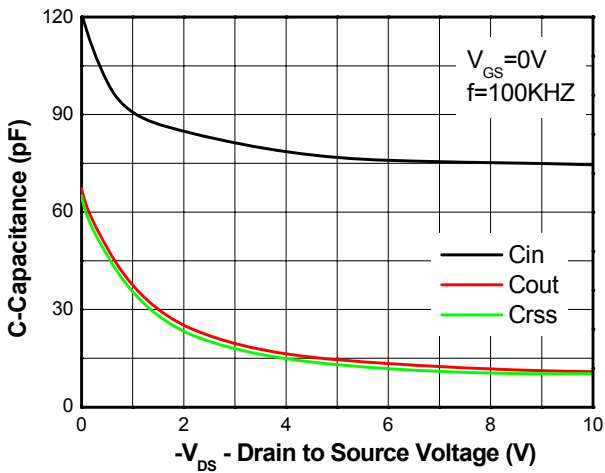
c Pulse width < 380 $\mu\text{s}$ , Duty Cycle < 2%

d Maximum junction temperature  $T_J=150^\circ\text{C}$ .

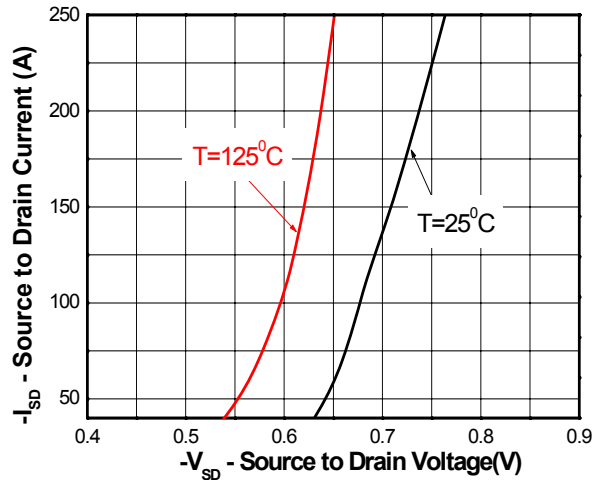
**Electronics Characteristics (Ta=25°C, unless otherwise noted)**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-to-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0\text{ V}, I_D = -250\mu\text{A}$	-20			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -16\text{ V}, V_{GS} = 0\text{ V}$			-1	$\mu\text{A}$
Gate-to-source Leakage Current	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 5\text{ V}$			$\pm 5$	$\mu\text{A}$
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = -250\mu\text{A}$	-0.44	-0.65	-0.81	V
Drain-to-source On-resistance <sup>b, c</sup>	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -0.45\text{ A}$		495	853	m $\Omega$
		$V_{GS} = -2.5\text{ V}, I_D = -0.35\text{ A}$		665	1053	
		$V_{GS} = -1.8\text{ V}, I_D = -0.25\text{ A}$		882	1303	
Forward Transconductance	$g_{FS}$	$V_{DS} = -5\text{ V}, I_D = -0.45\text{ A}$		1.25		S
<b>CAPACITANCES, CHARGES</b>						
Input Capacitance	$C_{ISS}$	$V_{GS} = 0\text{ V},$ $f = 100\text{ KHZ},$ $V_{DS} = -10\text{ V}$		74.5		pF
Output Capacitance	$C_{OSS}$			10.8		
Reverse Transfer Capacitance	$C_{RSS}$			10.2		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = -4.5\text{ V},$ $V_{DS} = -10\text{ V},$ $I_D = -0.45\text{ A}$		1.67		nC
Threshold Gate Charge	$Q_{G(TH)}$			0.17		
Gate-to-Source Charge	$Q_{GS}$			0.30		
Gate-to-Drain Charge	$Q_{GD}$			0.59		
<b>SWITCHING CHARACTERISTICS</b>						
Turn-On Delay Time	$t_d(ON)$	$V_{GS} = -4.5\text{ V},$ $V_{DS} = -10\text{ V},$ $I_D = -0.45\text{ A}$ $R_G = 6\ \Omega$		0.50		$\mu\text{s}$
Rise Time	$t_r$			1.76		
Turn-Off Delay Time	$t_d(OFF)$			7.0		
Fall Time	$t_f$			8.5		
<b>BODY DIODE CHARACTERISTICS</b>						
Forward Voltage	$V_{SD}$	$V_{GS} = 0\text{ V}, I_S = -0.15\text{ A}$		-0.75	-1.5	V

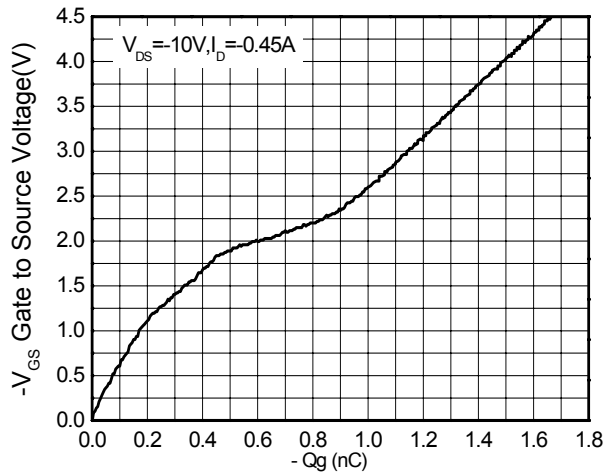
**Typical Characteristics (Ta=25°C, unless otherwise noted)**

**Output characteristics**

**Transfer characteristics**

**On-Resistance vs. Drain current**

**On-Resistance vs. Gate-to-Source voltage**

**On-Resistance vs. Junction temperature**

**Threshold voltage vs. Temperature**



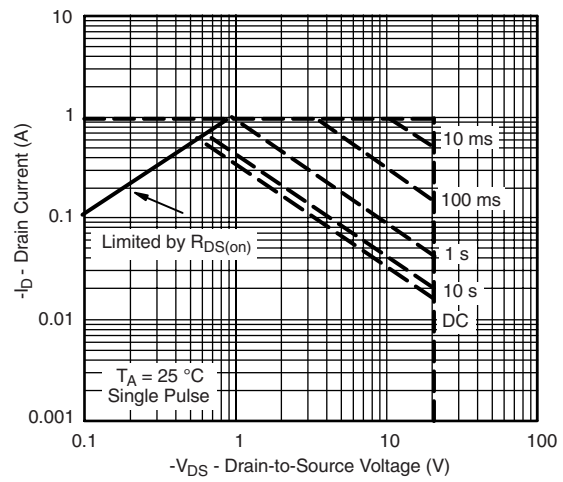
Capacitance



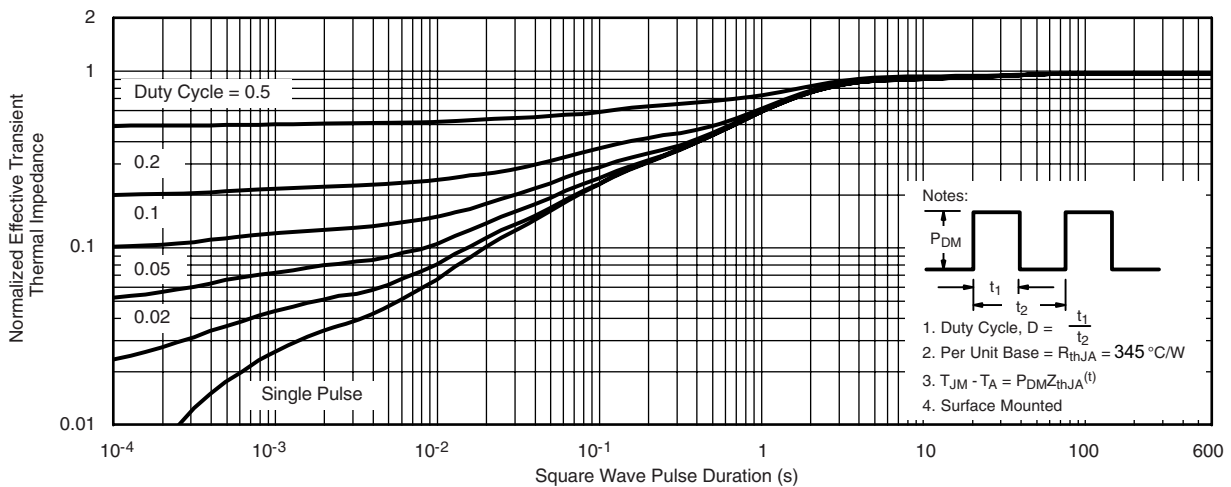
Body diode forward voltage



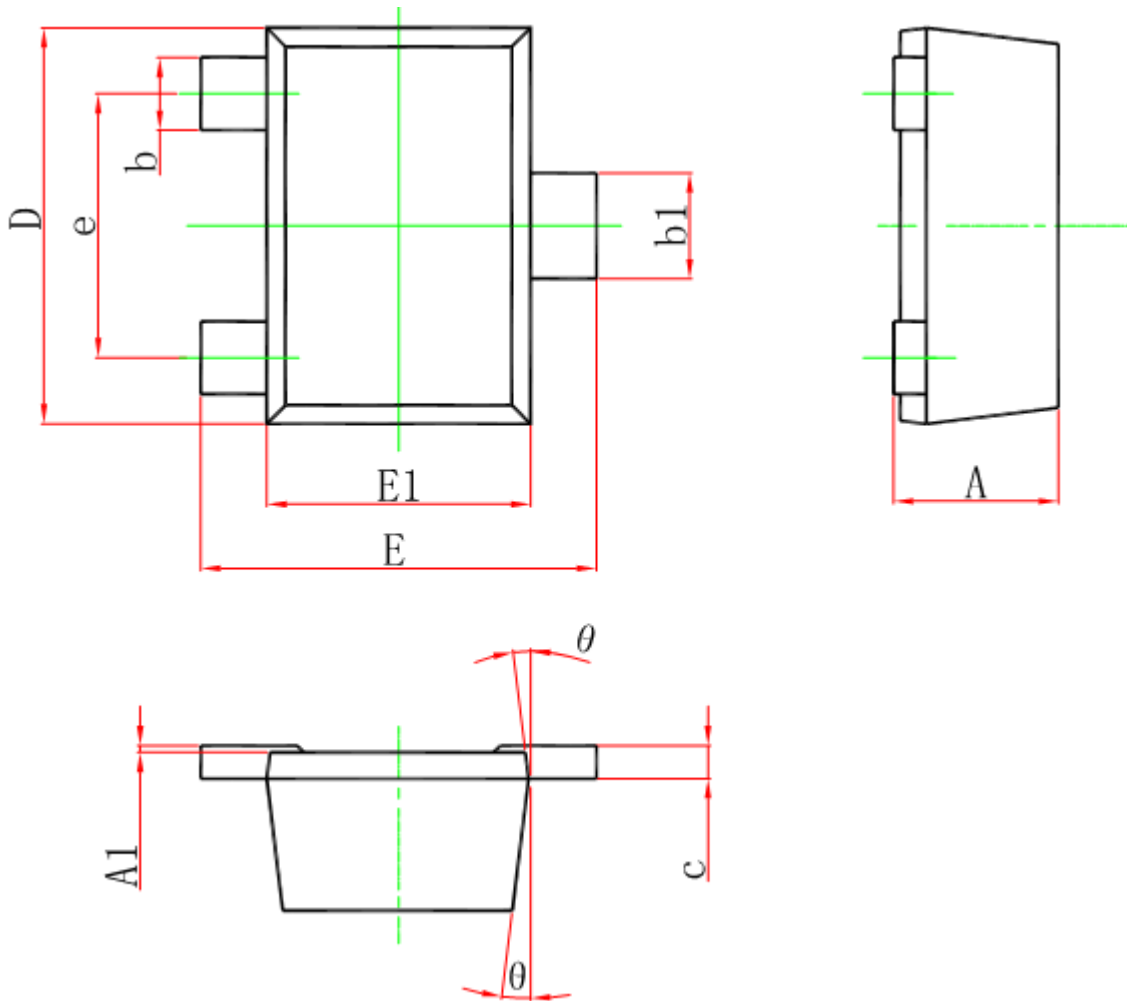
Gate Charge Characteristics



Safe operating power



Transient thermal response (Junction-to-Ambient)

**Package outline dimensions**
**SOT-723**


Symbol	Dimensions in millimeter	
	Min.	Max.
A		0.500
A1	0.000	0.050
b	0.170	0.270
b1	0.270	0.370
c		0.150
D	1.150	1.250
E	1.150	1.250
E1	0.750	0.850
e	0.800TYP	
θ	7° REF	

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