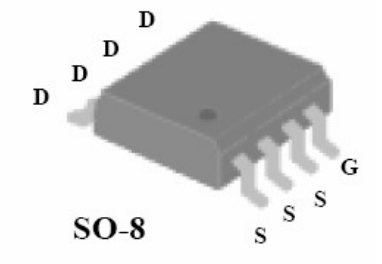
WPM4005

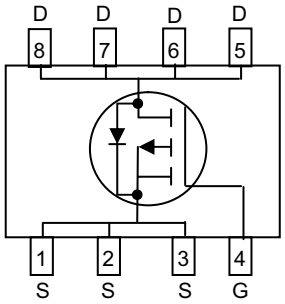
Single P-Channel, -40V, -7.4A, Power MOSFET

V_{DS} (V)	Rds(on) (Ω)	I_D (A)
-40	0.0225@ V_{GS}= – 10V	-6.0
	0.0285@ V_{GS}= – 4.5V	-4.0



Descriptions

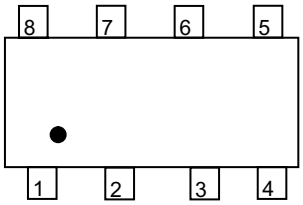
The WPM4005 is P-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent $R_{DS\ (ON)}$ with low gate charge. This device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product WPM4005 is Pb-free.



Pin configuration (Top view)

Features

- Trench Technology
- Supper high density cell design
- Excellent ON resistance for higher DC current
- Extremely Low Threshold Voltage
- Small package SO-8



= Device Code

= Month(A~Z)

Marking

Applications

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

Order information

Device	Package	Shipping
WPM4005-8/TR	SO-8	3000/Reel&Tape

Absolute Maximum ratings

Parameter		Symbol	10 S	Steady State	Unit
Drain-Source Voltage		V_{DS}	-40		V
Gate-Source Voltage		V_{GS}	±25		
Continuous Drain Current [a]	T_A=25°C	I_D	-7.4	-5.8	A
	T_A=70°C		-5.9	-4.7	
Maximum Power Dissipation [a]	T_A=25°C	P_D	2.5	1.5	W
	T_A=70°C		1.6	1.0	
Continuous Drain Current [b]	T_A=25°C	I_D	-6.8	-5.6	A
	T_A=70°C		-5.4	-4.5	
Maximum Power Dissipation [b]	T_A=25°C	P_D	2.0	1.4	W
	T_A=70°C		1.3	1.3	
Pulsed Drain Current [c]		I_{DM}	-30		A
Operating Junction Temperature		T_J	150		°C
Lead Temperature		T_L	260		°C
Storage Temperature Range		T_{stg}	-55 to 150		°C

Thermal resistance ratings

Parameter		Symbol	Typical	Maximum	Unit
Junction-to-Ambient Thermal Resistance [a]	t ≤ 10 s	$R_{\theta JA}$	40	50	°C/W
	Steady State		65	80	
Junction-to-Ambient Thermal Resistance [b]	t ≤ 10 s	$R_{\theta JA}$	48	60	
	Steady State		70	86	
Junction-to-Case Thermal Resistance	Steady State	$R_{\theta JC}$	25	33	

a Surface mounted on FR4 Board using 1 square inch pad size, 1oz copper

b Surface mounted on FR4 board using minimum pad size, 1oz copper

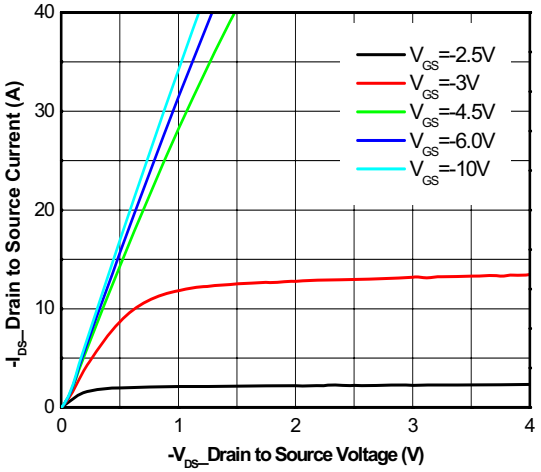
c Repetitive rating, pulse width limited by junction temperature, t_p=10μs, Duty Cycle=1%

d Repetitive rating, pulse width limited by junction temperature T_J=150°C.

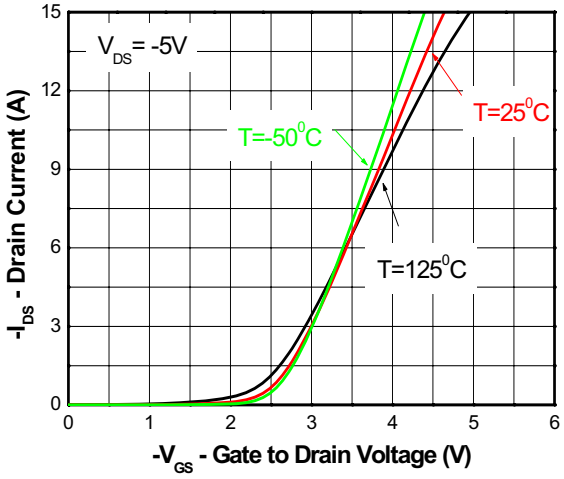
Electronics Characteristics (Ta=25°C, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0 V, I_D = -250uA	-40			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} =-40 V, V_{GS} = 0V			-100	nA
Gate-to-source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±25V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = -250uA	-1.0	-1.75	-3.0	V
Drain-to-source On-resistance	$R_{DS(on)}$	V_{GS} = -10V, I_D = -6.0A		22.5	29	mΩ
		V_{GS} = -4.5V, I_D = -4.0A		28.5	36	
Forward Transconductance	g_{FS}	V_{DS} = -10 V, I_D = -6.0A		14.0		S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1.0 MHz, V_{DS} = -25 V		2363		pF
Output Capacitance	C_{OSS}			161		
Reverse Transfer Capacitance	C_{RSS}			134		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = -10 V, V_{DS} = -15 V, I_D = -6.0A		42.6		nC
Threshold Gate Charge	$Q_{G(TH)}$			3.5		
Gate-to-Source Charge	Q_{GS}			5.3		
Gate-to-Drain Charge	Q_{GD}			9.8		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	td(ON)	V_{GS} = -10 V, V_{DS} = -20 V, I_D=-1.0A, R_G=3.0 Ω		14		ns
Rise Time	tr			6.8		
Turn-Off Delay Time	td(OFF)			76		
Fall Time	tf			7.6		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V_{SD}	V_{GS} = 0 V, I_S = -2.0A	-0.50	-0.76	-1.5	V

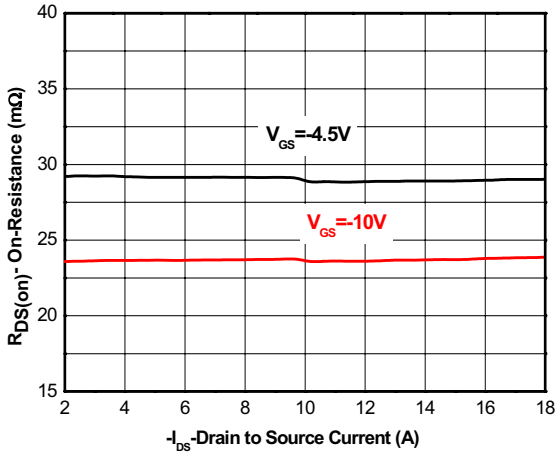
Typical Characteristics (Ta=25°C, unless otherwise noted)



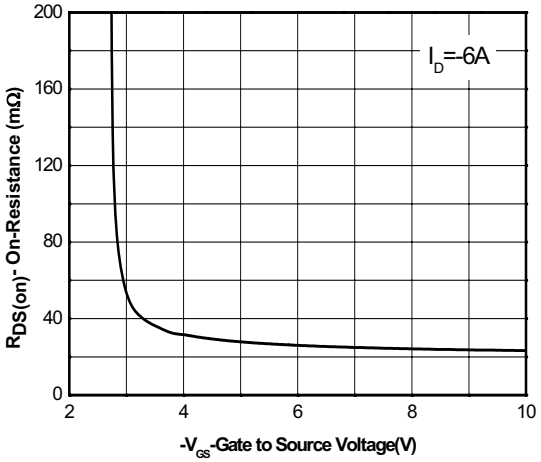
Output characteristics



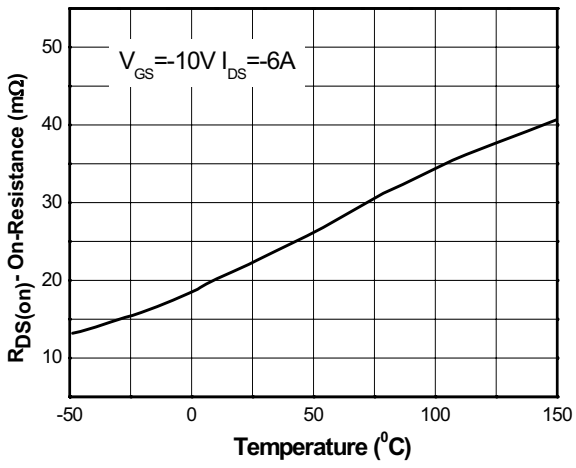
Transfer characteristics



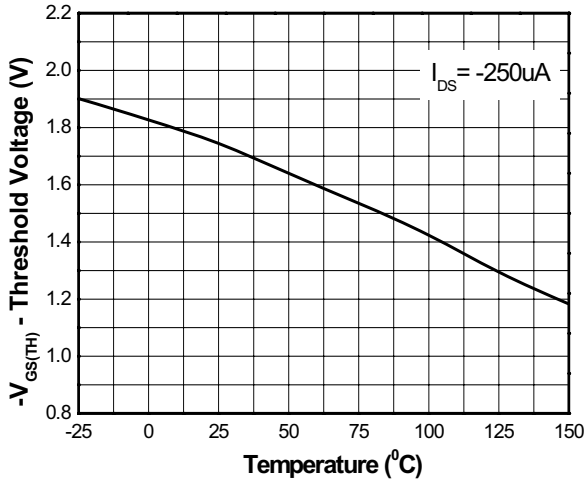
n-Resistance vs. Drain current



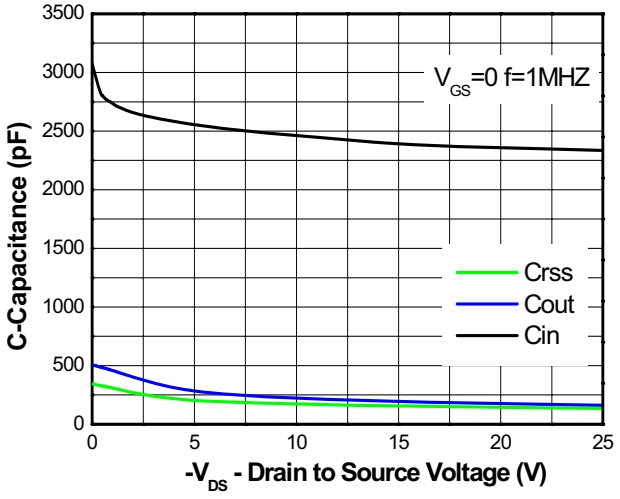
On-Resistance vs. Gate-to-Source voltage



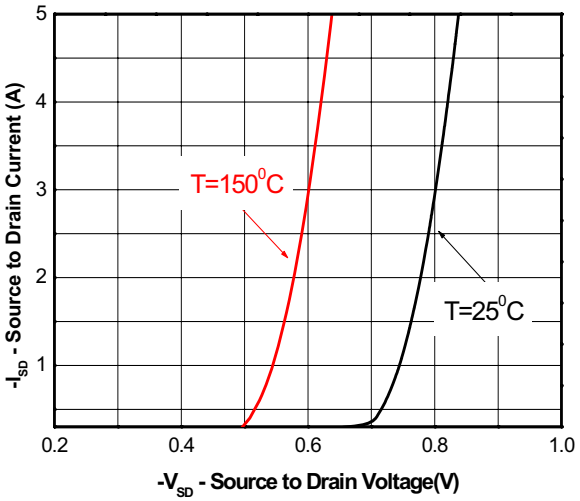
On-Resistance vs. Junction temperature



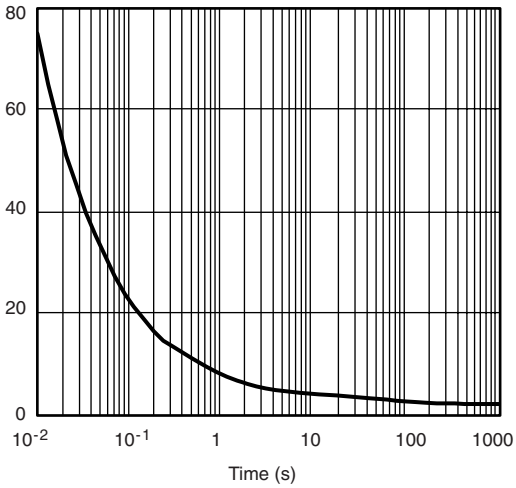
Threshold voltage vs. Temperature



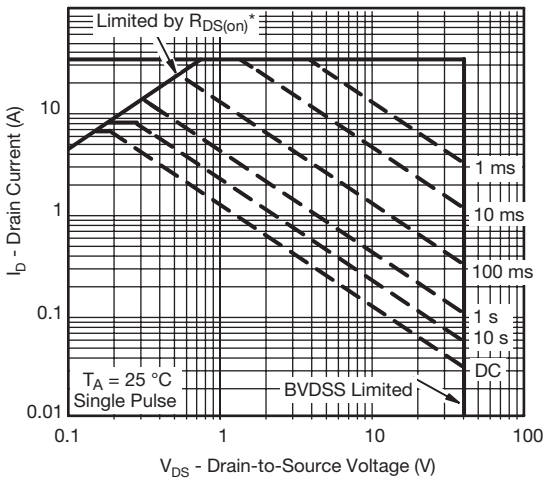
Capacitance



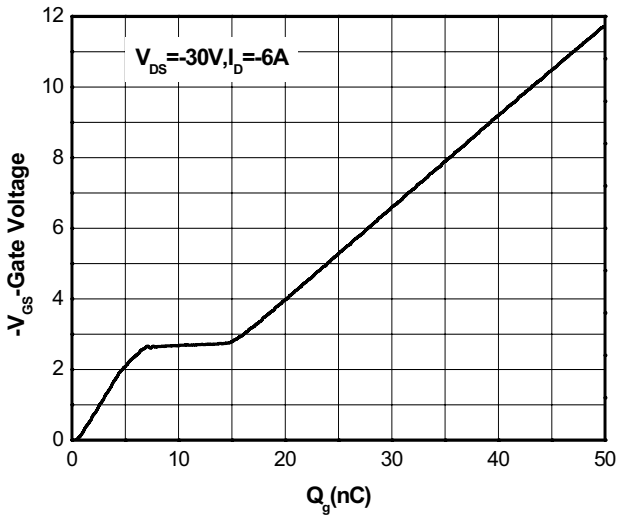
Body diode forward voltage



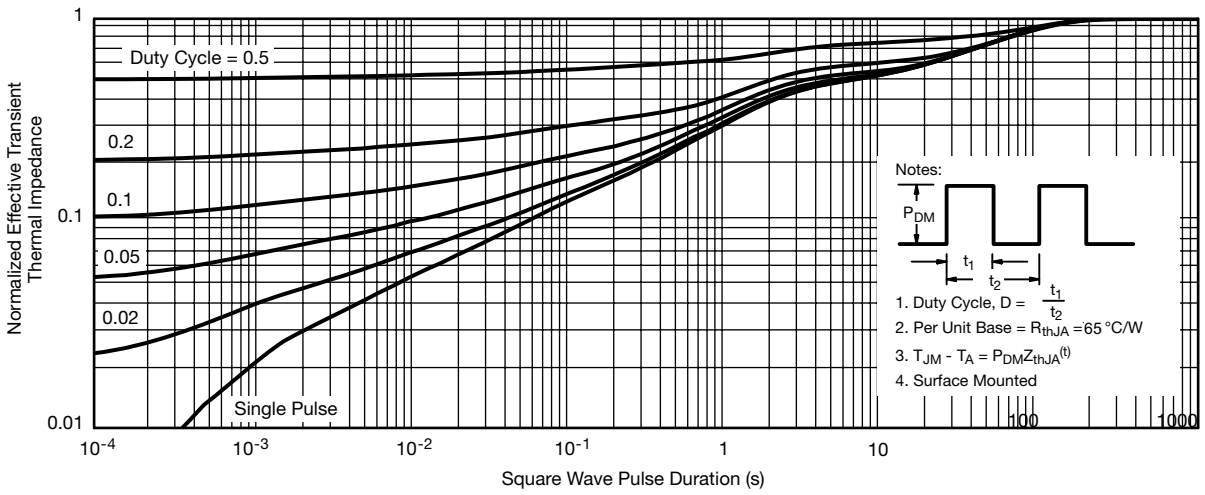
Single pulse power



Safe operating power



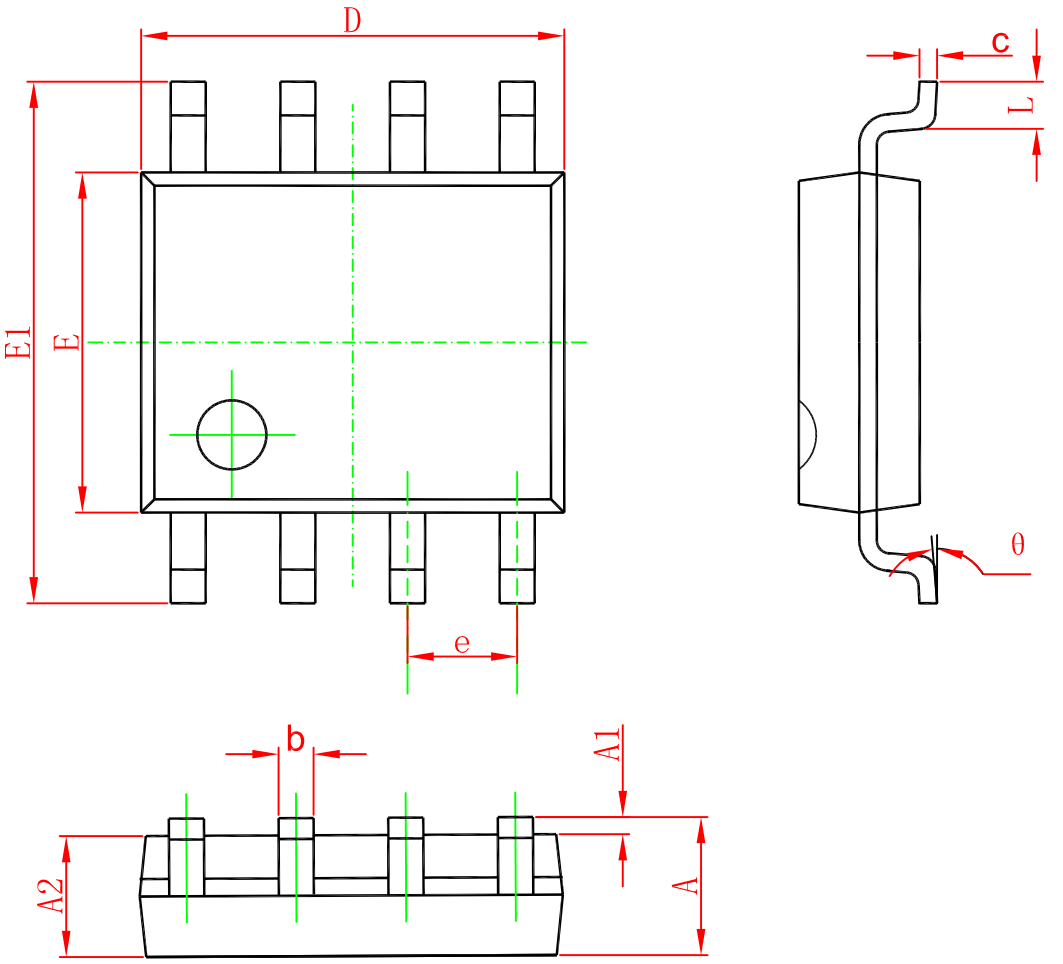
Gate Charge Characteristics



Transient thermal response (Junction-to-Ambient)

Package outline dimensions

SO-8



Symbol	Dimensions in millimeter		
	Min.	Typ.	Max.
A	1.350	1.550	1.750
A1	0.100	0.175	0.250
A2	1.350	1.450	1.550
b	0.330	0.420	0.510
c	0.170	0.210	0.250
D	4.700	4.900	5.100
E	3.800	3.900	4.000
E1	5.800	6.000	6.200
e	1.270(BSC)		
L	0.400	0.835	1.270
θ	0°		8°