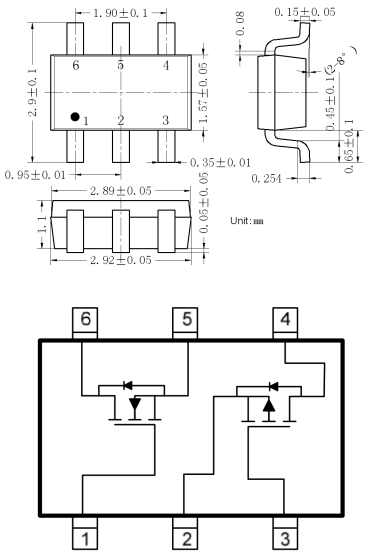
SOT-23-6L Plastic-Encapsulate MOSFETS

WCM2068-6

N- and P-Channel Complementary, 20V, MOSFET



1.3. Gate

4. 6. Drain

2. 5. Source

Features

- Trench Technology
- Supper high density cell design
- Excellent ON resistance
- Extremely Low Threshold Voltage
- Small package SOT-23-6L

Applications

- Driver: Relays, Solenoids, Lamps, Hammers
- Power supply converters circuit
- Load/Power Switching for portable device

Marking: 31C

Descriptions

The WCM2068 is the N-Channel and P-Channel enhancement MOS Field Effect Transistor as a single package for DC-DC converter or level shift applications, uses advanced trench technology and design to provide excellent RDS(ON) with low gate charge. Standard Product WCM2068 is Pb-free and Halogen-free.

Maximum Ratings (T_A=25°C unless otherwise specified)

Symbol	Parameter		N-Channel	P-Channel	Unit
V_{DSS}	Drain-Source voltage		20	-20	V
V_{GSS}	Gate-Source voltage		±8	±8	
I_D	Continuous Drain Current [1, 4]	T_A = 25°C	4.4	-2.8	A
		T_A = 70°C	3.5	-2.2	
I_{DM}	Pulsed Drain Current [3]		16	-10	A
P_D	Power Dissipation [1, 4]	T_A = 25°C	0.72		W
		T_A = 70°C	0.46		
T_J	Operation junction temperature		-55 ~ +150		°C
T_{stg}	Storage temperature range		-55 ~ +150		°C

Thermal Resistance Ratings (T_A=25°C unless otherwise specified)

Symbol	Parameter		Typ.	Max.	Unit
$R_{\theta JA}$	Junction-to-Ambient Thermal Resistance [1]	t ≤ 10s	74	92	°C/W
		Steady State	115	143	
$R_{\theta JA}$	Junction-to-Ambient Thermal Resistance [2]	t ≤ 10s	90	112	°C/W
		Steady State	138	172	
$R_{\theta JC}$	Junction-to-Case Thermal Resistance	Steady State	63	78	°C/W

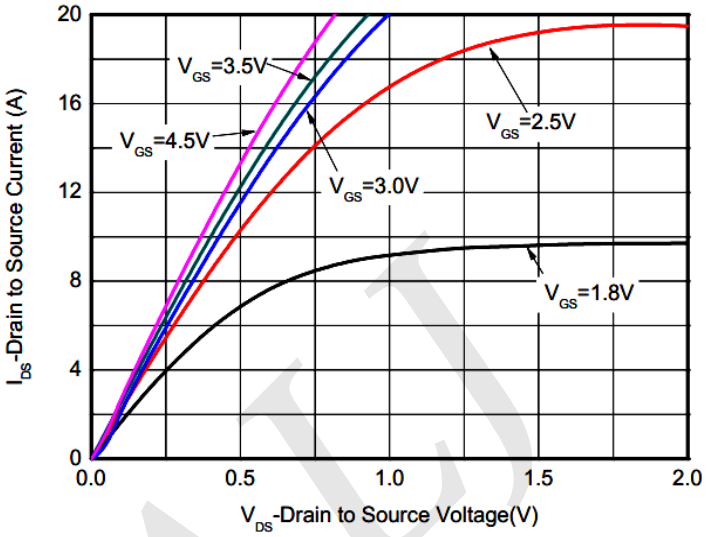
Notes

1. Surface mounted on FR4 Board using 1 square inch pad size, 1oz copper
2. Surface mounted on FR4 board using minimum pad size, 1oz copper
3. Pulse width<380μs, Duty Cycle<2%
4. Maximum junction temperature TJ=150°C. d. 1.6 mm from case.

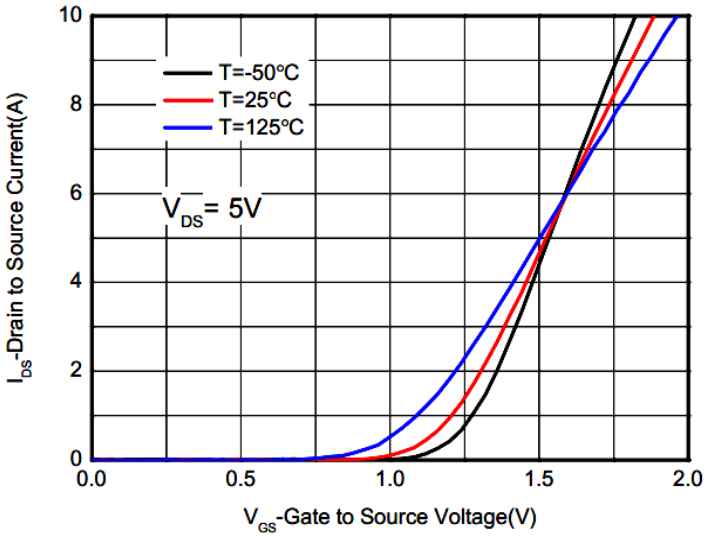
Electrical Characteristics (T_J=25°C unless otherwise specified)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
Off Characteristics							
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250μA	N-Ch	20			V
		V_{GS} = 0V, I_D = -250μA	P-Ch	-20			
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 16V, V_{GS} = 0V	N-Ch			1	μA
		V_{DS} = -16V, V_{GS} = 0V	P-Ch			-1	
I_{GSS}	Gate-body Leakage current	V_{DS} = 0V, V_{GS} = ±8V				±1	μA
ON Characteristics							
$V_{GS(th)}$	Gate-Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	N-Ch		0.65	1.0	V
		V_{DS} = V_{GS}, I_D = -250μA	P-Ch		-0.70	-1.0	
$R_{DS(on)}$	Drain-Source On-Resistance	V_{GS} = 4.5V, I_D = 3.4A	N-Ch		33	46	mΩ
		V_{GS} = -4.5V, I_D = -2.8A	P-Ch		85	116	
		V_{GS} = 3.3V, I_D = 3.0A	N-Ch		37	55	
		V_{GS} = -3.3V, I_D = -2.0A	P-Ch		100	125	
		V_{GS} = 2.5V, I_D = 3.0A	N-Ch		41	69	
		V_{GS} = -2.5V, I_D = -2.0A	P-Ch		110	131	
Dynamic Characteristics							
C_{iss}	Input Capacitance	N-mos: V_{DS} = 10V, V_{GS} = 0V, f = 1MHz P-mos: V_{DS} = -10V, V_{GS} = 0V, f = 1MHz	N-Ch		345		pF
			P-Ch		531		
C_{oss}	Output Capacitance		N-Ch		55		
			P-Ch		61		
C_{rss}	Reverse Transfer Capacitance		N-Ch		48		
			P-Ch		54		
$Q_{g(tot)}$	Total Gate Charge	N-mos: V_{DD} = 10V, V_{GS} = 4.5V, I_D = 3.4A P-mos: V_{DD} = -10V, V_{GS} = -4.5V I_D = -2.8A	N-Ch		5.25		nC
			P-Ch		5.8		
$Q_{g(th)}$	Threshold gate charge		N-Ch		0.65		
			P-Ch		0.72		
Q_{gs}	Gate-Source Charge		N-Ch		1.2		
			P-Ch		1.1		
Q_{gd}	Gate-Drain Charge		N-Ch		1.05		
			P-Ch		1.0		
$t_{d(on)}$	Turn-On Delay Time	N-mos: V_{DD} = 10V, V_{GS} = 4.5V, I_D = 1.0A, R_G = 6Ω P-mos: V_{DD} = -10V, I_D = -1.2A, V_{GS} = -4.5V, R_G = 6Ω	N-Ch		18.6		ns
			P-Ch		21.6		
t_r	Rise Time		N-Ch		8.2		
			P-Ch		8.6		
$t_{d(off)}$	Turn-Off Delay Time		N-Ch		55		
			P-Ch		58		
t_f	Fall Time		N-Ch		7.6		
			P-Ch		8.4		
V_{SD}	Diode Forward Voltage	V_{GS} = 0V, I_S = 1.0A	N-Ch		0.7	1.5	V
		V_{GS} = 0V, I_S = -1.0A	P-Ch		-0.8	-1.5	

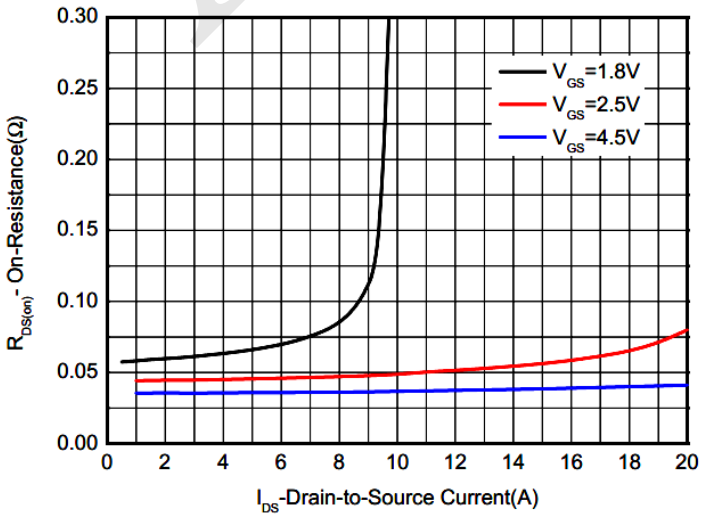
N-Channel Typical Characteristics



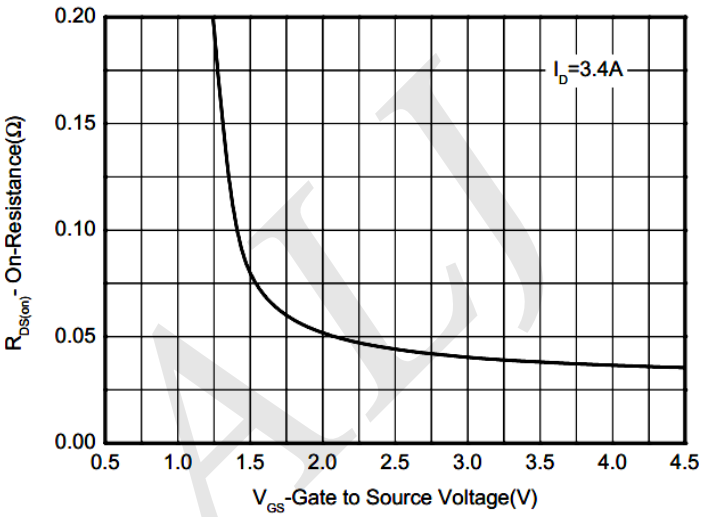
Output Characteristics



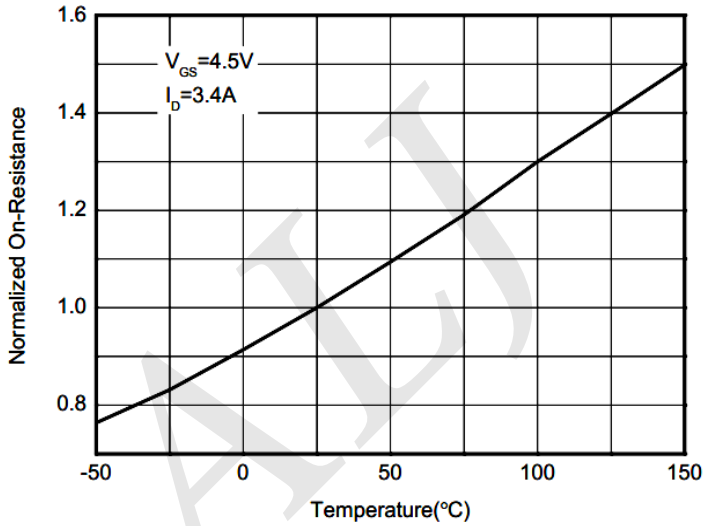
Transfer Characteristics



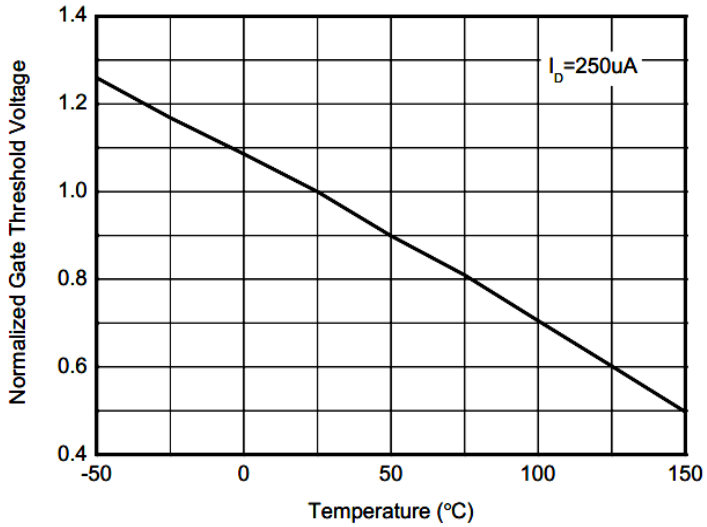
On-Resistance vs. Drain Current



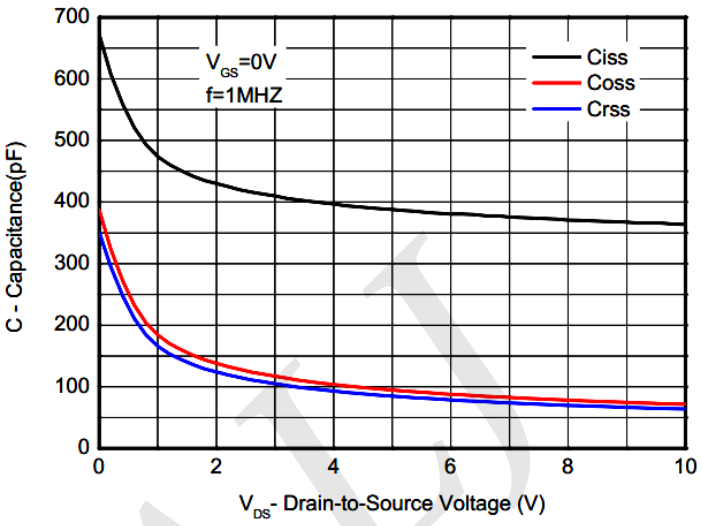
On-Resistance vs. Gate-to-Source Voltage



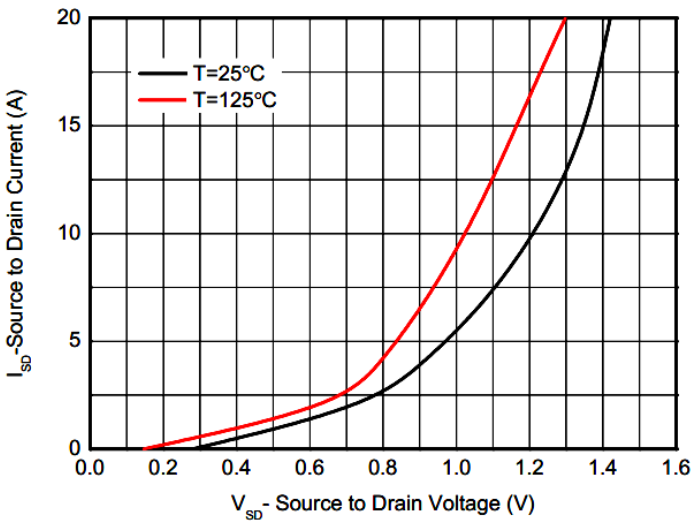
On-Resistance vs. Junction Temperature



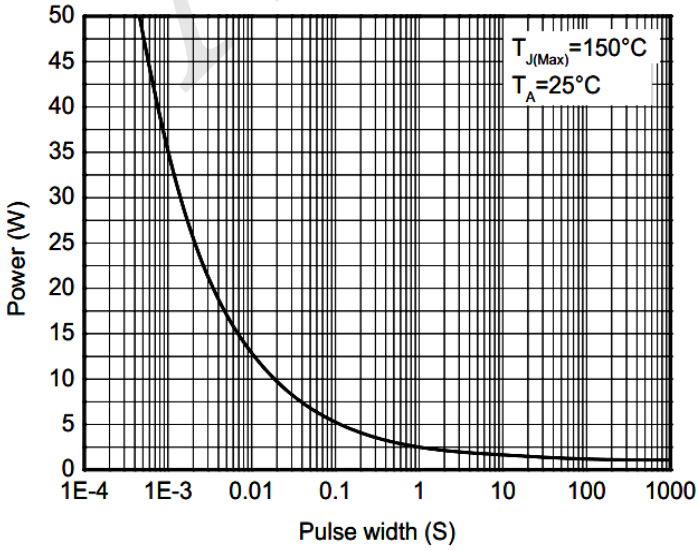
Threshold Voltage vs. Temperature



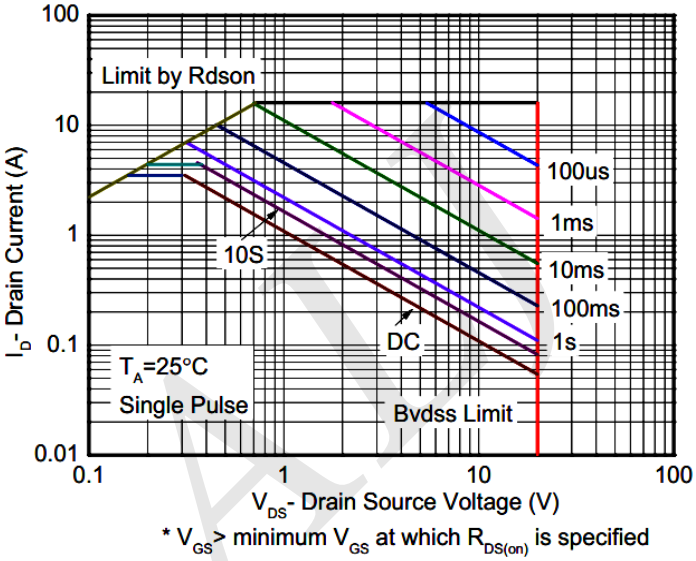
Capacitance



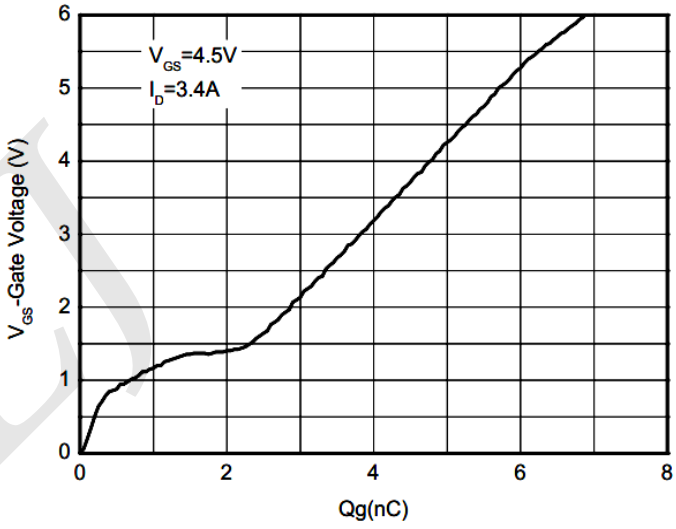
Body Diode Forward Voltage



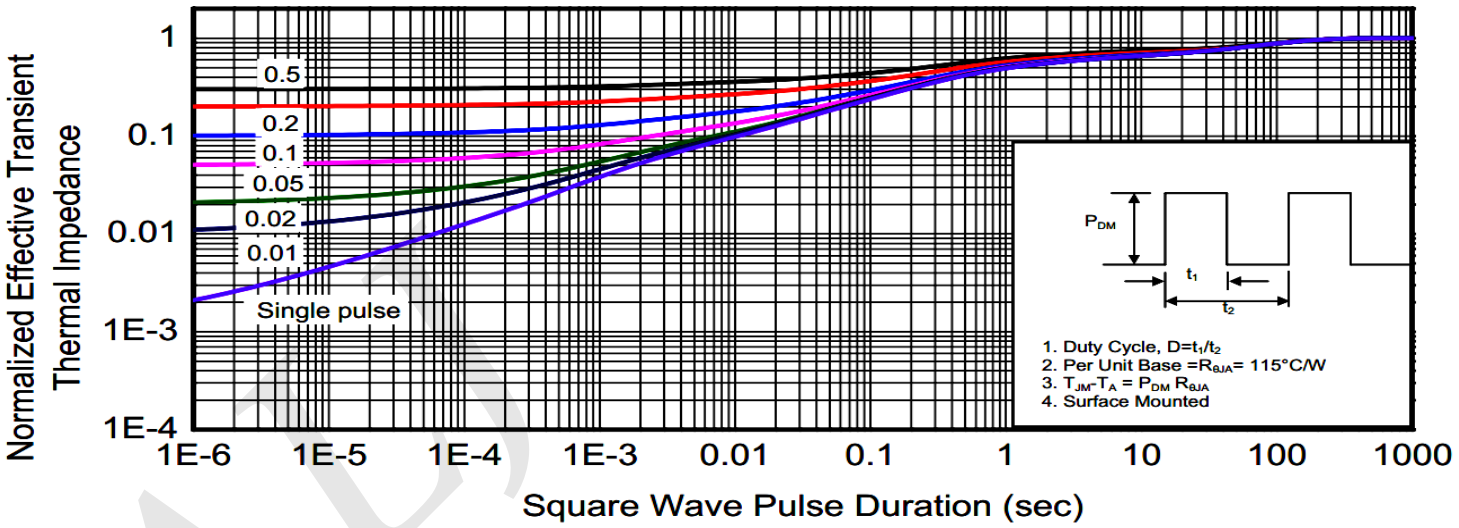
Single pulse power



Safe operating power

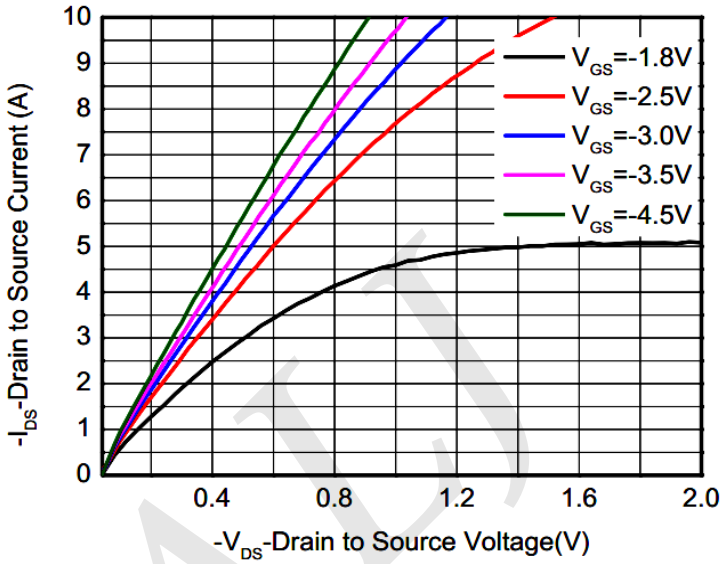


Gate charge Characteristics

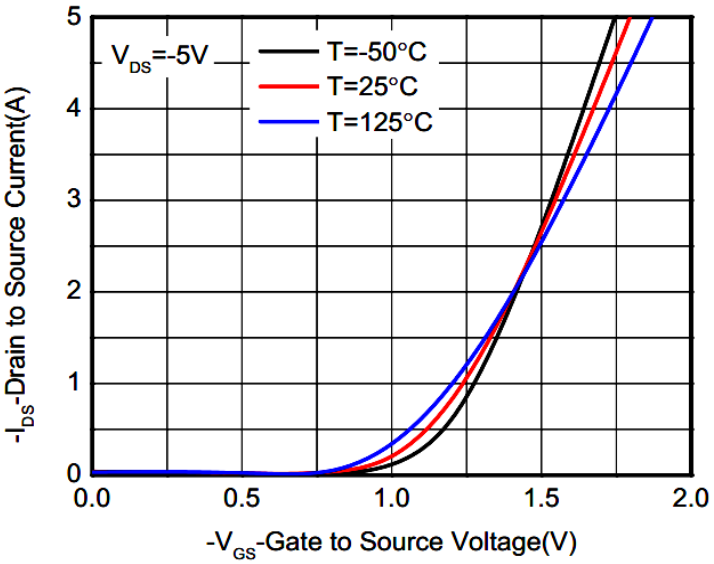


Transient thermal response (Junction-to-Ambient)

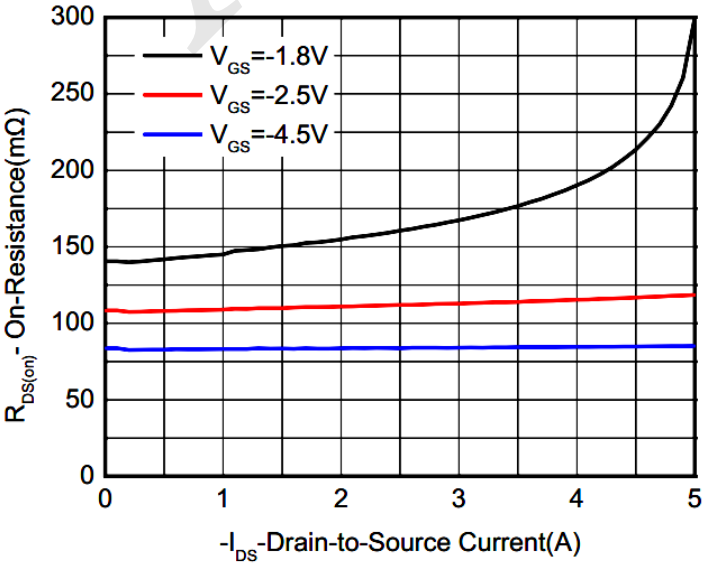
P-Channel Typical Characteristics (Cont.)



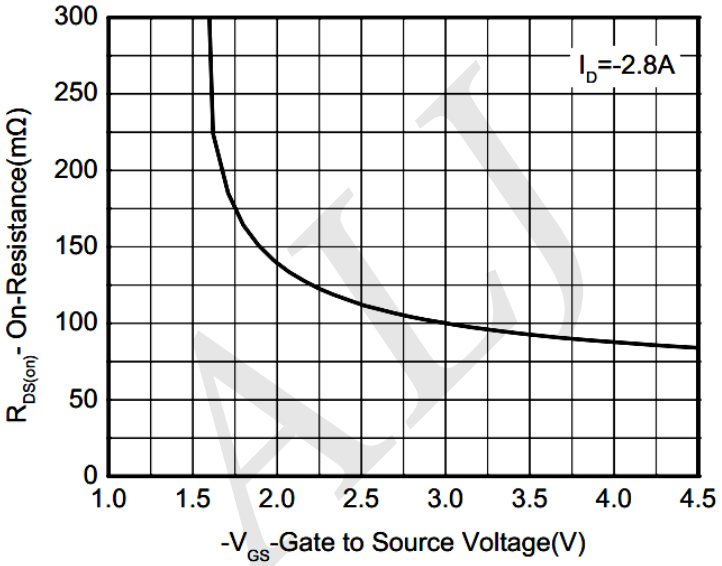
Output characteristics



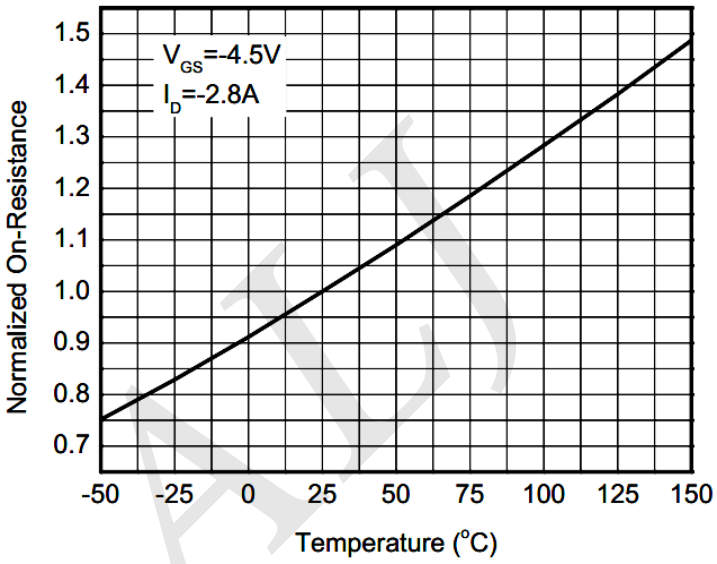
Transfer characteristics



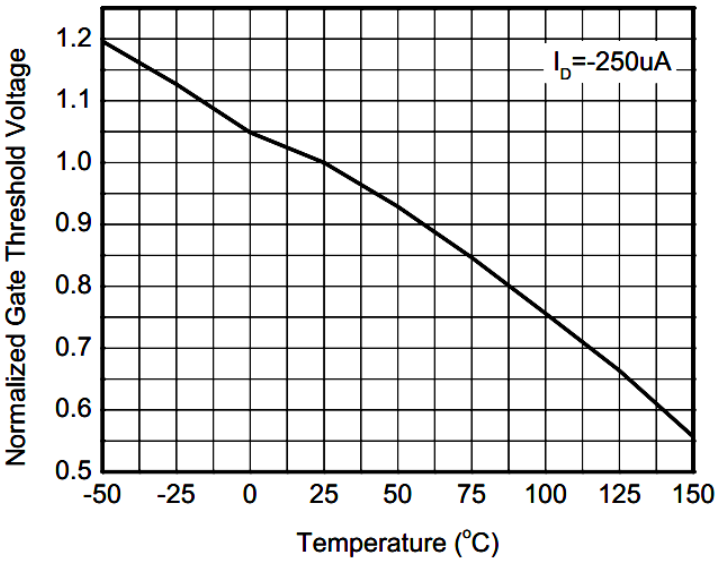
On-Resistance vs. Drain current



On-Resistance vs. Gate-to-Source voltage

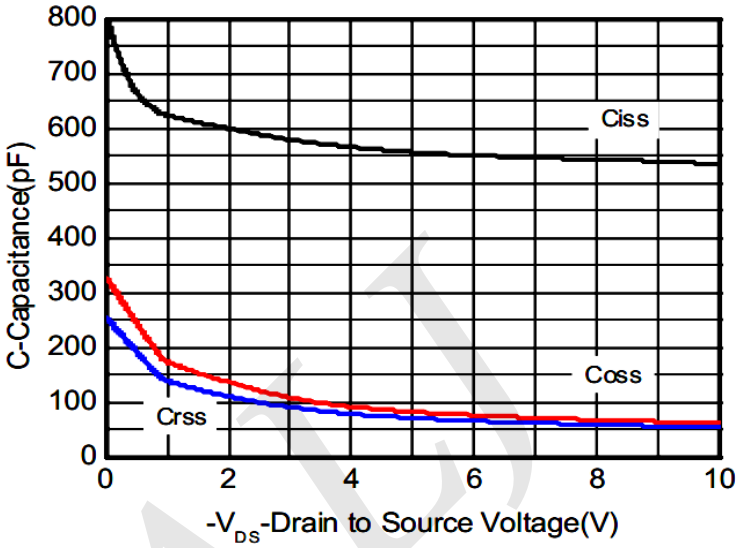


On-Resistance vs. Junction temperature

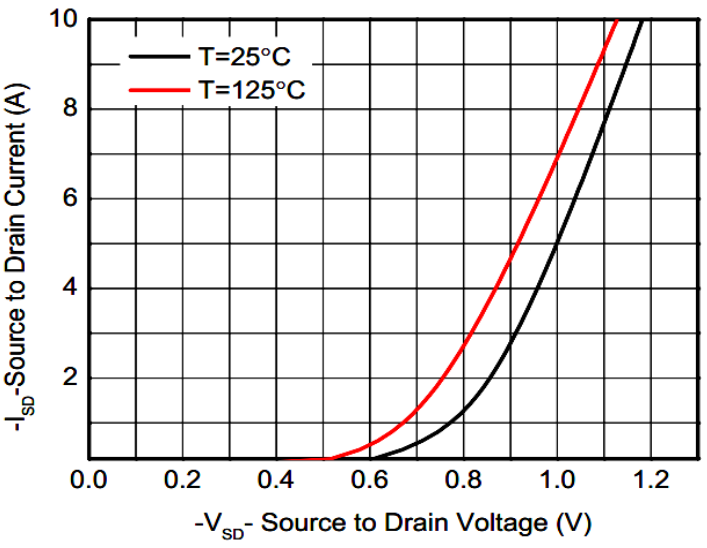


Threshold voltage vs. Temperature

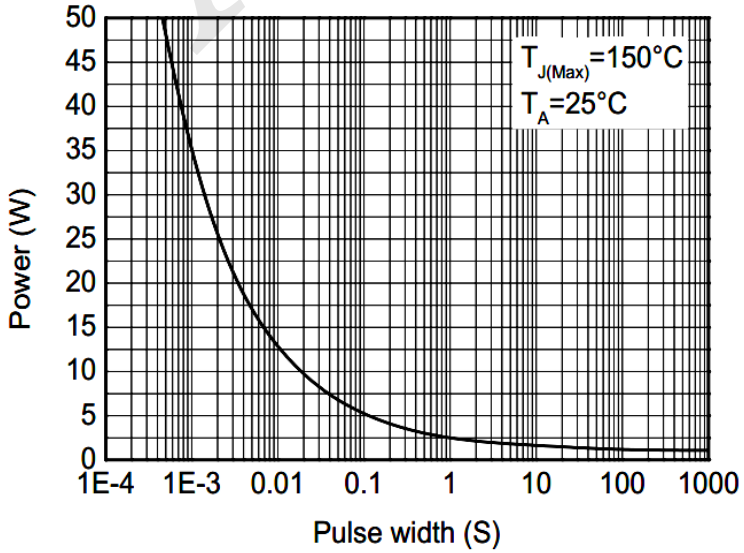
P-Channel Typical Characteristics (Cont.)



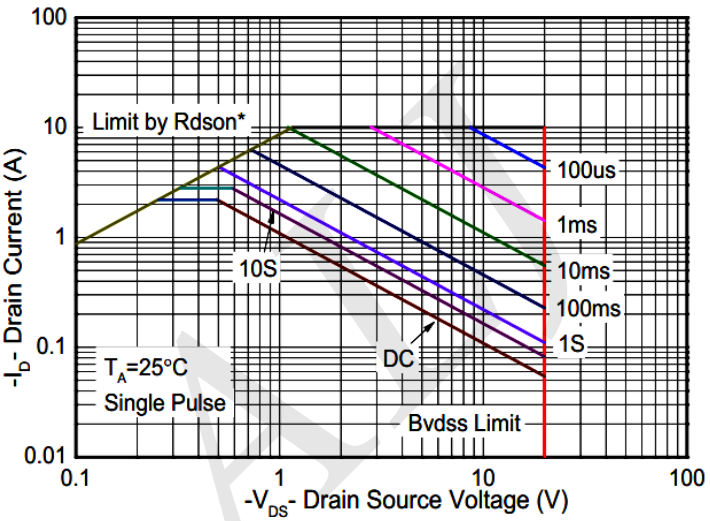
Capacitor



Body diode forward voltage

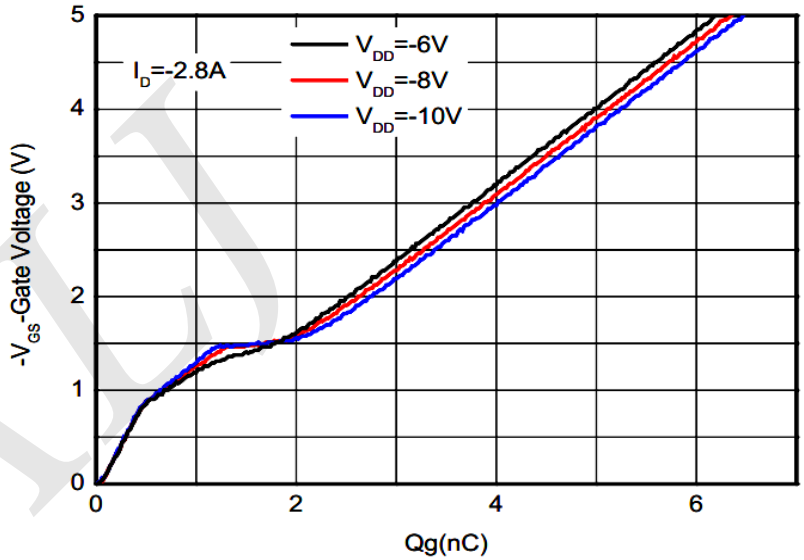


Single pulse power (Junction-to-ambient)

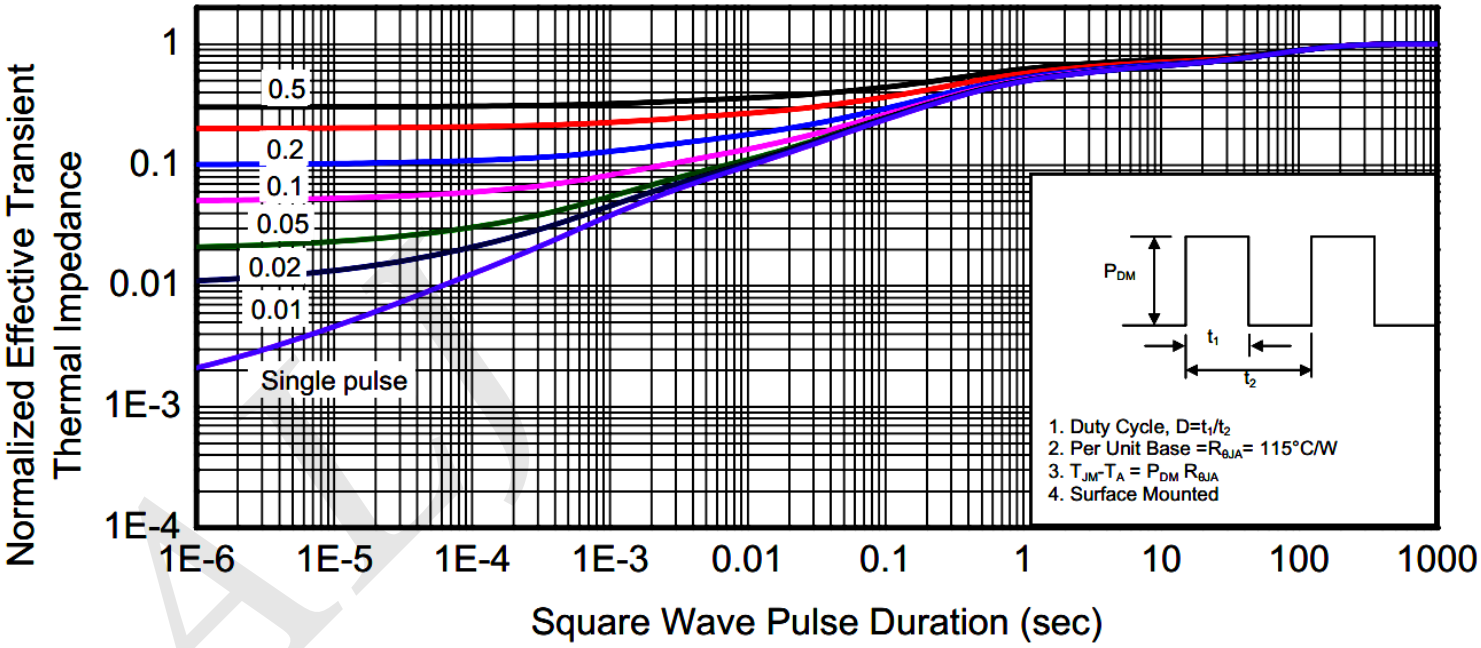


* V_{GS}> minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe operating power



Gate charge Characteristics


Normalized Effective Transient Thermal Impedance
1
0.1
0.01
1E-3
1E-4
0.5
0.2
0.1
0.05
0.02
0.01
Single pulse
P_DM
t1
t2
1. Duty Cycle, D=t1/t2
2. Per Unit Base =RθJA= 115°C/W
3. TJM-TA = PDM RθJA
4. Surface Mounted
1E-6
1E-5
1E-4
1E-3
0.01
0.1
1
10
100
1000
Square Wave Pulse Duration (sec)