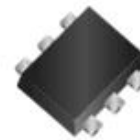


WCM2007

N- and P-Channel, 20V, MOSFET

[Http://www.sh-willsemi.com](http://www.sh-willsemi.com)

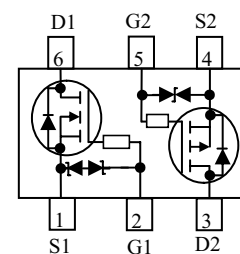
$V_{(BR)DSS}$	$R_{DS(on)}$ Typical. (Ω)
N-Channel 20 V	0.18@ 4.5V
	0.23@ 2.5V
	0.30@ 1.8V
ESD protection	
P-Channel -20 V	0.45@ -4.5V
	0.60@ -2.5V
	0.75@ -1.8V
ESD protection	



SOT-563

Descriptions

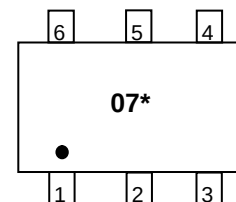
The WCM2007 is the N- and P-Channel enhancement MOS Field Effect Transistor as a single package for DC-DC converter or level shift applications, uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. Standard Product WCM2007 is Pb-free.



Pin configuration (Top view)

Features

- Trench Technology
- Supper high density cell design for extremely low $R_{ds(on)}$
- Exceptional ON resistance and maximum DC current capability
- Small package design with SOT-563.



07 = Device Code

* = Date Code

Marking

Applications

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

Order Information

Device	Package	Shipping
WCM2007-6/TR	SOT-563	3000/Tape&Reel

Absolute Maximum Ratings

($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Parameter		Symbol	N-Channel		P-Channel		Unit
			10 s	Steady State	10 s	Steady State	
Drain-Source Voltage		V _{DS}	+20		-20		V
Gate-Source Voltage		V _{GS}	±6				V
Continuous Drain Current ^a	T _A =25°C	I _D	0.89	0.79	-0.56	-0.50	A
	T _A =70°C		0.71	0.63	-0.45	-0.40	
Maximum Power Dissipation ^a	T _A =25°C	P _D	0.37	0.29	0.37	0.29	W
	T _A =70°C		0.23	0.18	0.23	0.18	
Continuous Drain Current ^b	T _A =25°C	I _D	0.76	0.69	-0.48	-0.44	A
	T _A =70°C		0.61	0.55	-0.38	-0.35	
Maximum Power Dissipation ^b	T _A =25°C	P _D	0.27	0.22	0.27	0.22	W
	T _A =70°C		0.17	0.14	0.17	0.14	
Pulsed Drain Current ^c		I _{DM}	1.4		-1.0		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	$^{\circ}\text{C/W}$
Junction-to-Ambient Thermal Resistance ^a	$t \leq 10 \text{ s}$	$R_{\theta JA}$	290	335	
	Steady State		340	430	
Junction-to-Ambient Thermal Resistance ^b	$t \leq 10 \text{ s}$	$R_{\theta JA}$	385	460	
	Steady State		465	555	
Junction-to-Case Thermal Resistance		$R_{\theta JC}$	280	320	

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, Pulse width<380 μs , Duty Cycle<2%

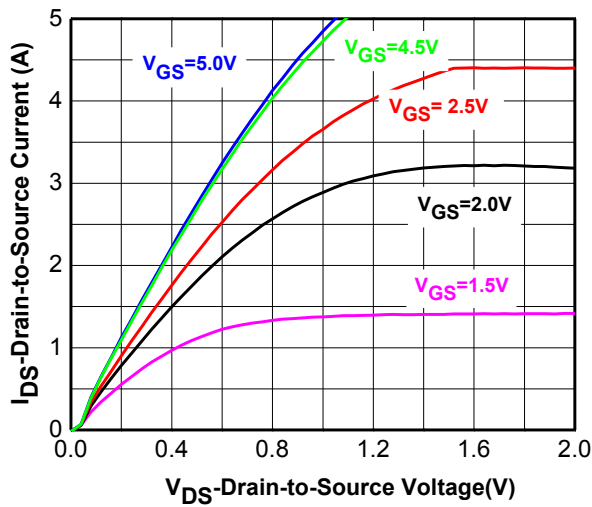
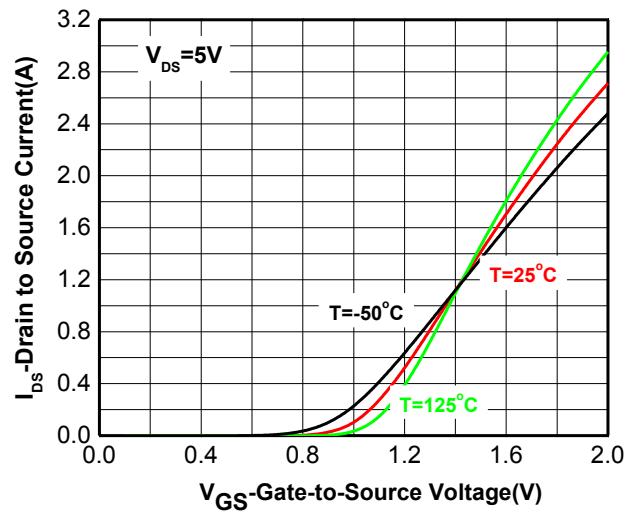
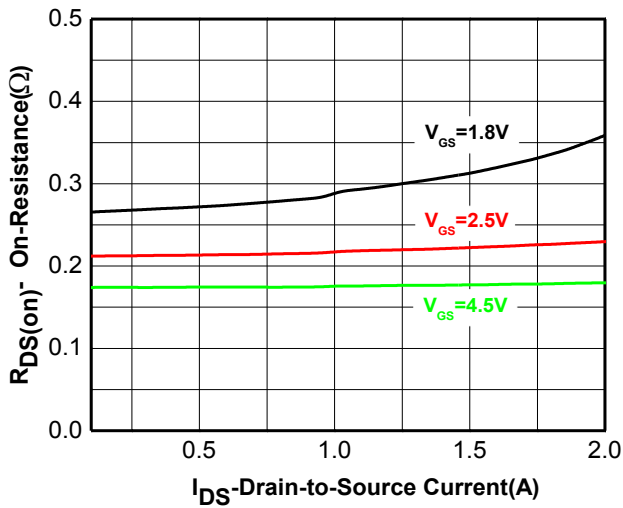
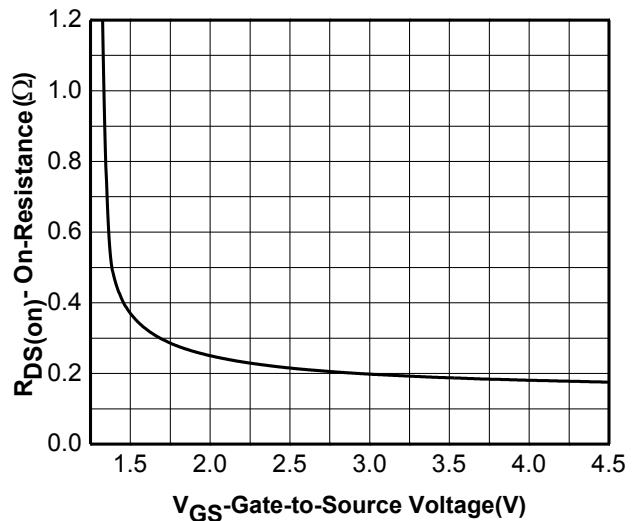
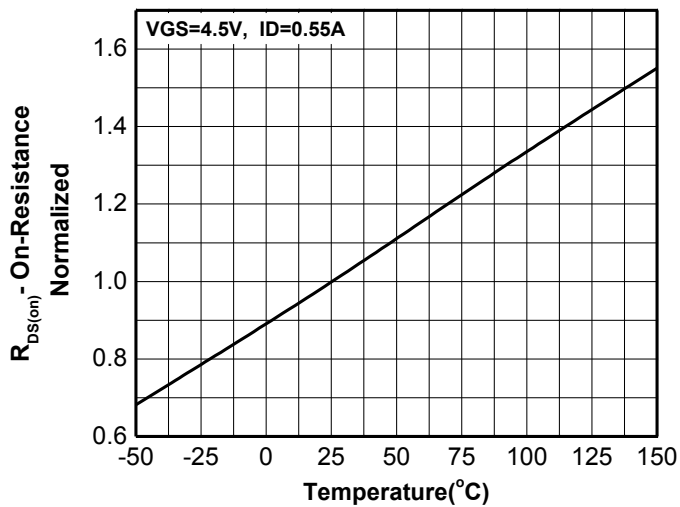
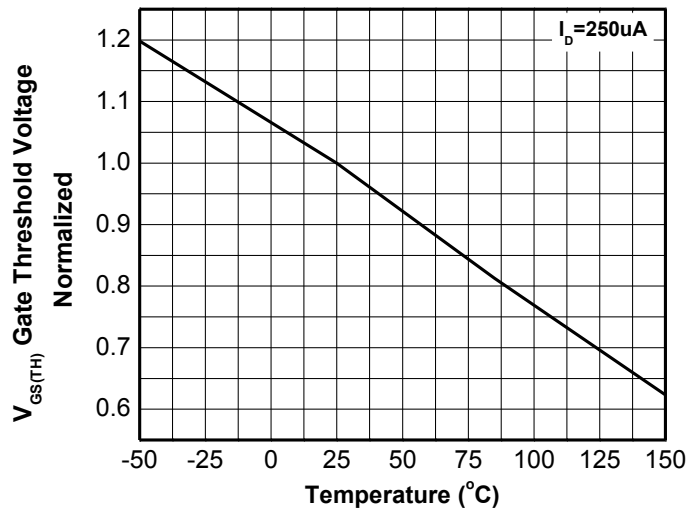
d Repetitive rating, pulse width limited by junction temperature $T_J=150^{\circ}\text{C}$.

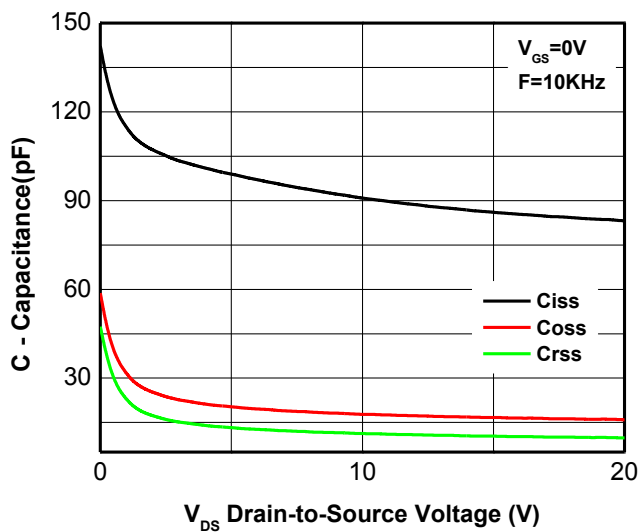
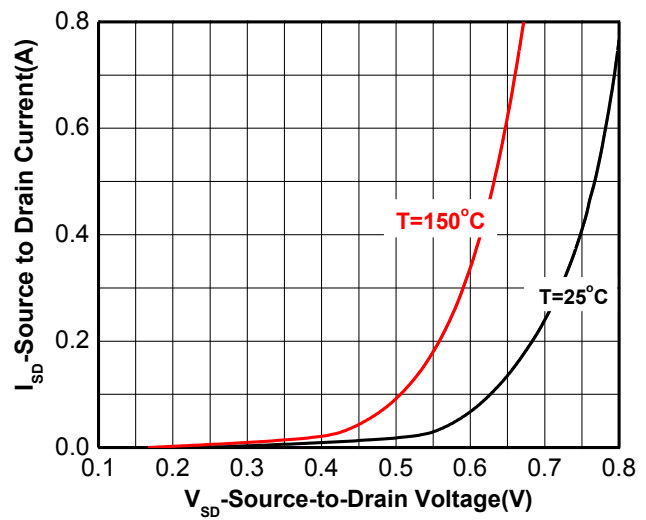
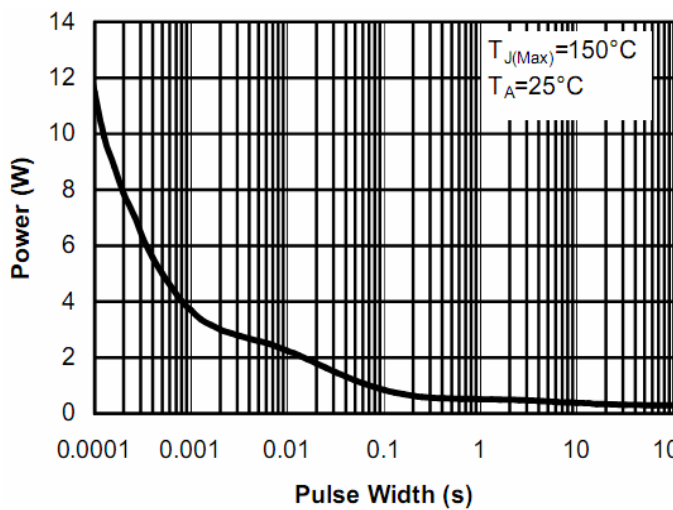
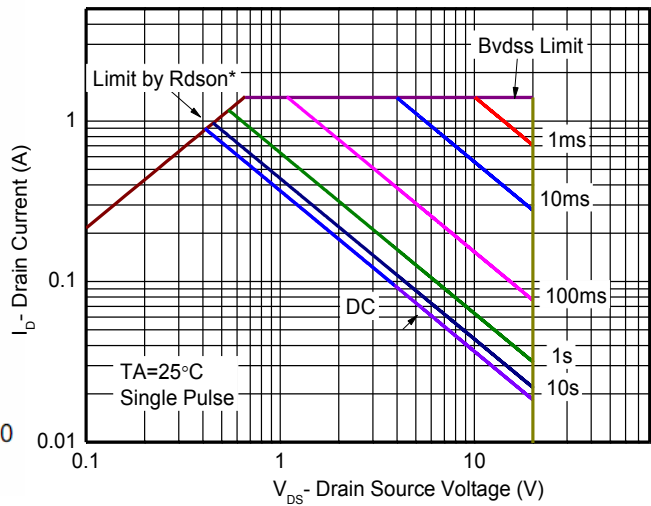
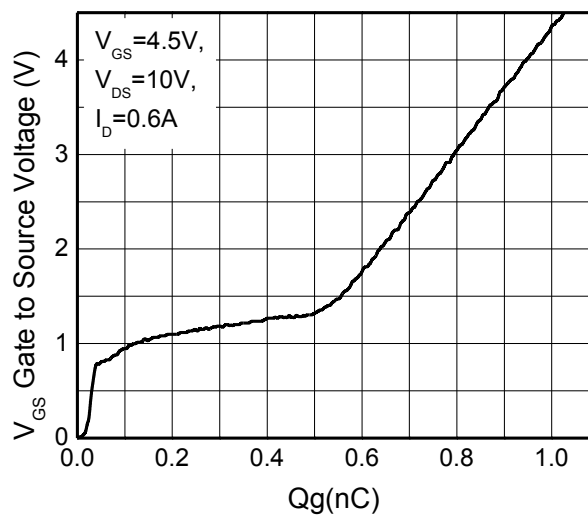
Electronics Characteristics

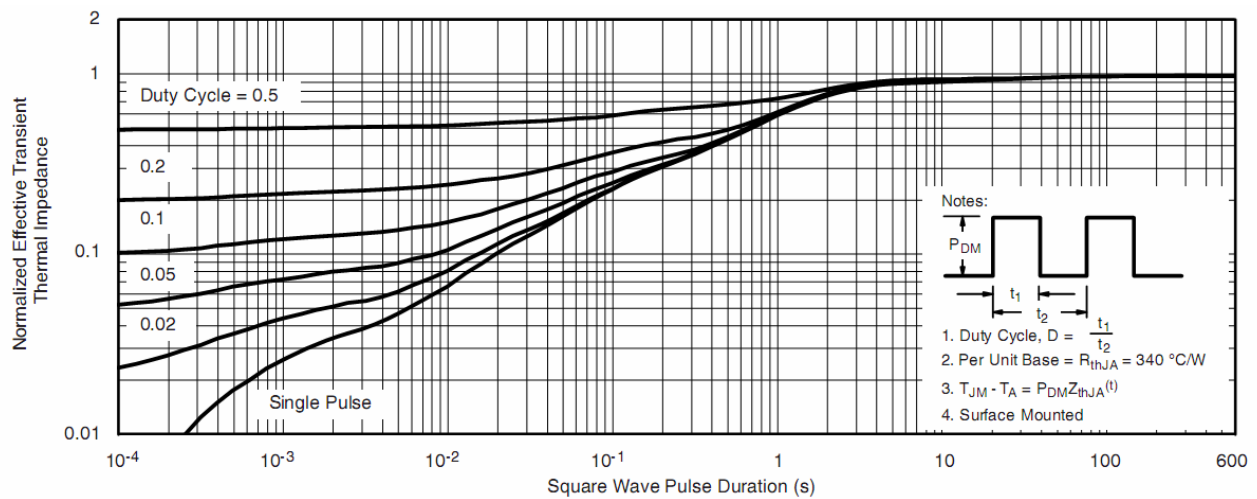
(T_A=25°C unless otherwise noted)

Symbol	Parameter	Test Condition		Min	Typ.	Max	Unit
Off Characteristics							
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	N-Ch	20			V
		V _{GS} =0V, I _D =-250uA	P-Ch	-20			
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =20V, V _S =0V	N-Ch			+1	uA
		V _{DS} =-20V, V _S =0V	P-Ch			-1	
I _{GSS}	Gate –Source leakage current	V _{DS} =0V, V _{GS} =±5V	N-Ch			±5	uA
			P-Ch			±5	
ON Characteristics							
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D =250uA	N-Ch	0.40	0.72	0.90	V
		V _{DS} = V _{GS} , I _D =-250uA	P-Ch	-0.40	-0.62	-0.90	
R _{DS(on)}	Drain-Source On-Resistance	V _{GS} =4.5V, I _D =0.55A	N-Ch		0.18	0.31	Ω
		V _{GS} =-4.5V, I _D =-0.45A	P-Ch		0.45	0.81	
		V _{GS} =2.5V, I _D =0.45A	N-Ch		0.23	0.36	
		V _{GS} =-2.5V, I _D =-0.35A	P-Ch		0.60	1.050	
		V _{GS} =1.8V, I _D =0.35A	N-Ch		0.30	0.46	
		V _{GS} =-1.8V, I _D =-0.25A	P-Ch		0.75	1.30	
g _{FS}	Forward Transconductance	V _{DS} = 5 V, I _D = 0.55A	N-Ch		2.0		S
		V _{DS} = -5 V, I _D =-0.45A	P-Ch		1.25		
Dynamic Characteristics							
Ciss	Input Capacitance	NMOS: V _{DS} =10V, V _{GS} =0V, F=10KHz PMOS:V _{DS} =-10V, V _{GS} =0V, F=10KHz	N-Ch		90		pF
Coss	Output Capacitance		P-Ch		65.8		
			N-Ch		17.7		
Crss	Reverse Transfer Capacitance		P-Ch		19.8		
			N-Ch		11.2		
			P-Ch		7.7		
Q _{G(TOT)}	Total Gate Charge	NMOS: V _{DS} =10V, V _{GS} =4.5V, I _D =0.6A	N-Ch		1.05		nC
Q _{G(TH)}	Threshold Gate Charge		P-Ch		0.90		
			N-Ch		0.06		
Q _{GS}	Gate-Source Charge		P-Ch		0.05		
		N-Ch		0.12			
Q _{GD}	Gate-Drain Charge	PMOS: V _{DS} =-10V, V _{GS} =-4.5V, I _D =-0.6A	P-Ch		0.10		
			N-Ch		0.38		
			P-Ch		0.44		

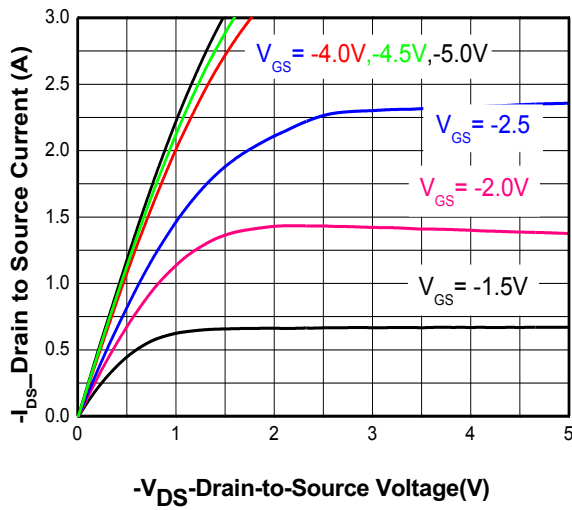
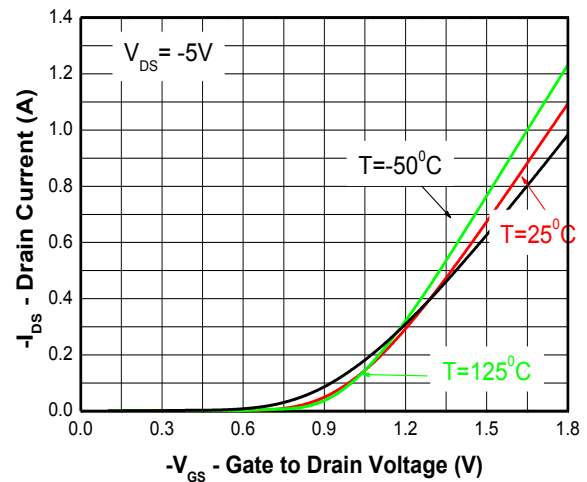
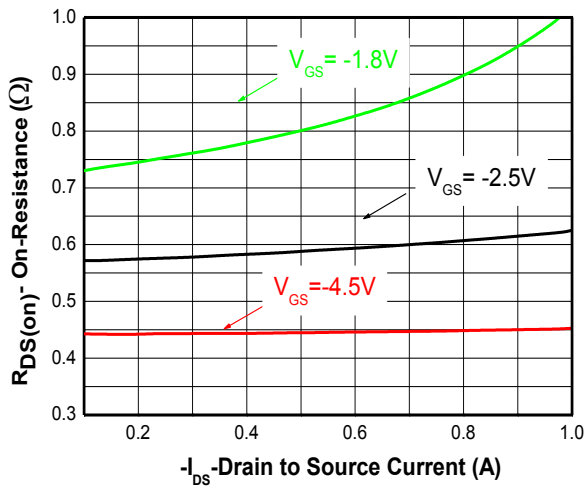
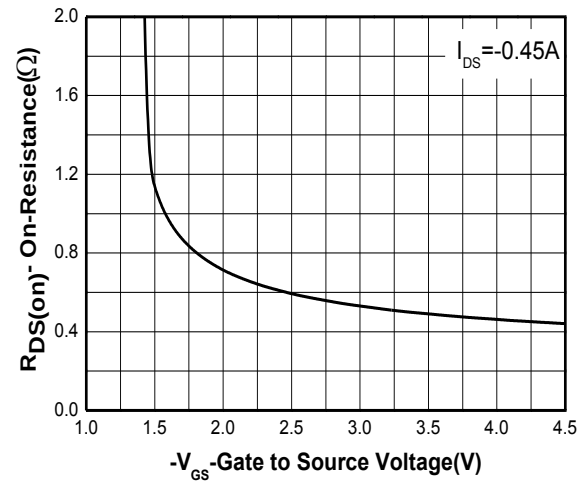
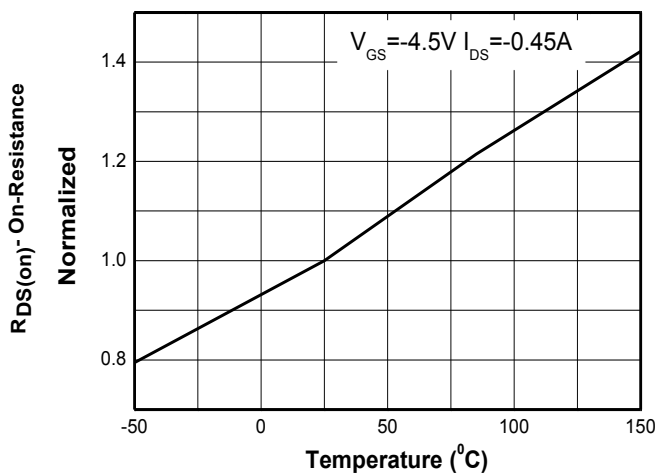
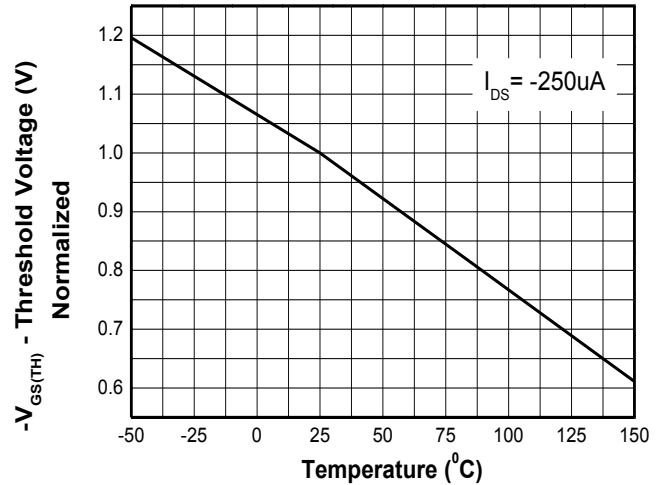
Symbol	Parameter	Test Condition		Min	Typ.	Max	Unit
Switching Characteristics							
td(on)	Turn-On Delay Time	NMOS:V _{DD} =10V, V _{GEN} =4.5V, I _D =0.55A, , R _G =6Ω	N-Ch		46		ns
			P-Ch		420		
tr	Turn-On Rise Time		N-Ch		87		
			P-Ch		1320		
td(off)	Turn-Off Delay Time	PMOS:V _{DD} =-10V, V _{GEN} =-4.5V, I _D =-0.5A, , R _G =6Ω	N-Ch		776		
			P-Ch		8000		
tf	Turn-Off Fall Time		N-Ch		368		
			P-Ch		8600		
Drain-to-Source Diode Characteristics							
V _{SD}	Forward Diode Voltage	V _{GS} =0V, I _S =0.35A	N-Ch	0.5	0.74	1.5	V
		V _{GS} =0V, I _S =-0.25A	P-Ch	-0.5	-0.80	-1.5	

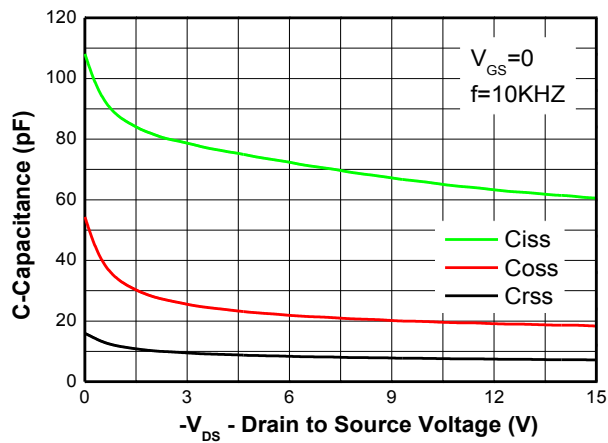
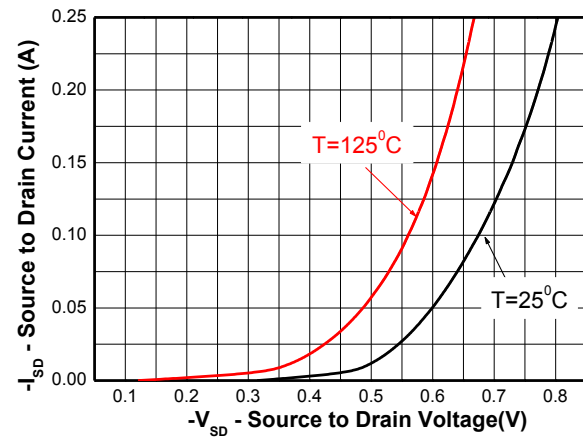
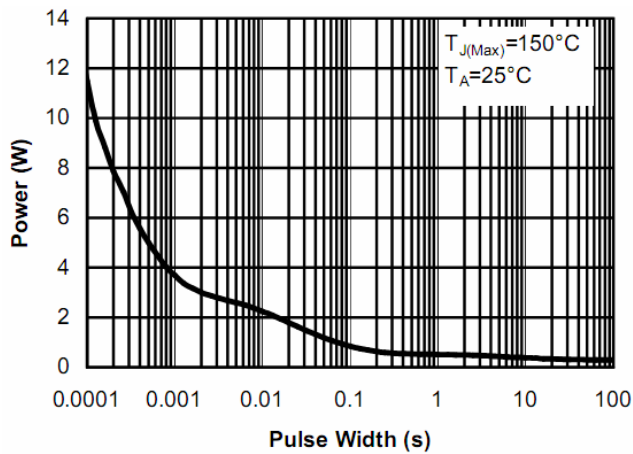
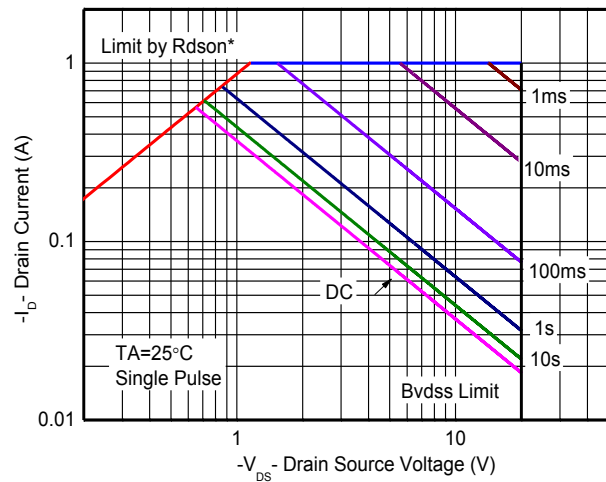
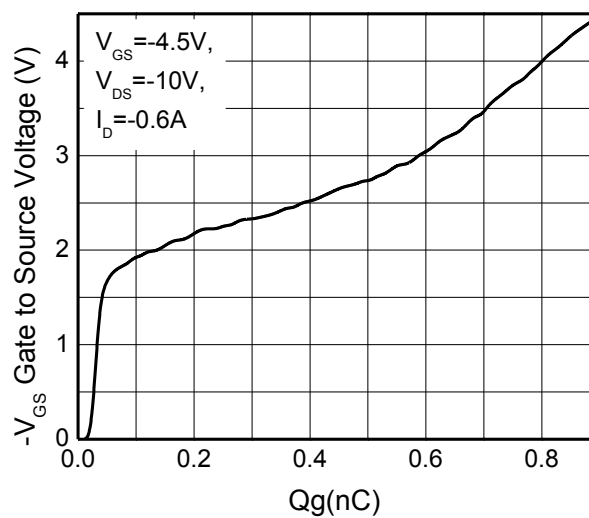
NMOS Typical Characteristics (Ta=25°C, unless otherwise noted)

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

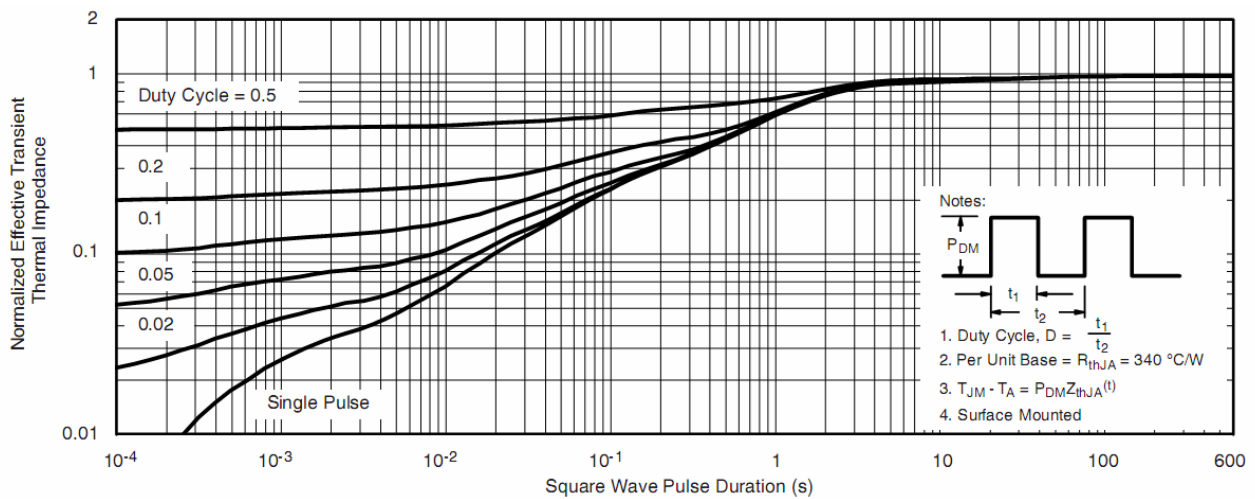

Capacitance

Body diode forward voltage

Single pulse power

Safe operating power

Gate Charge Characteristics



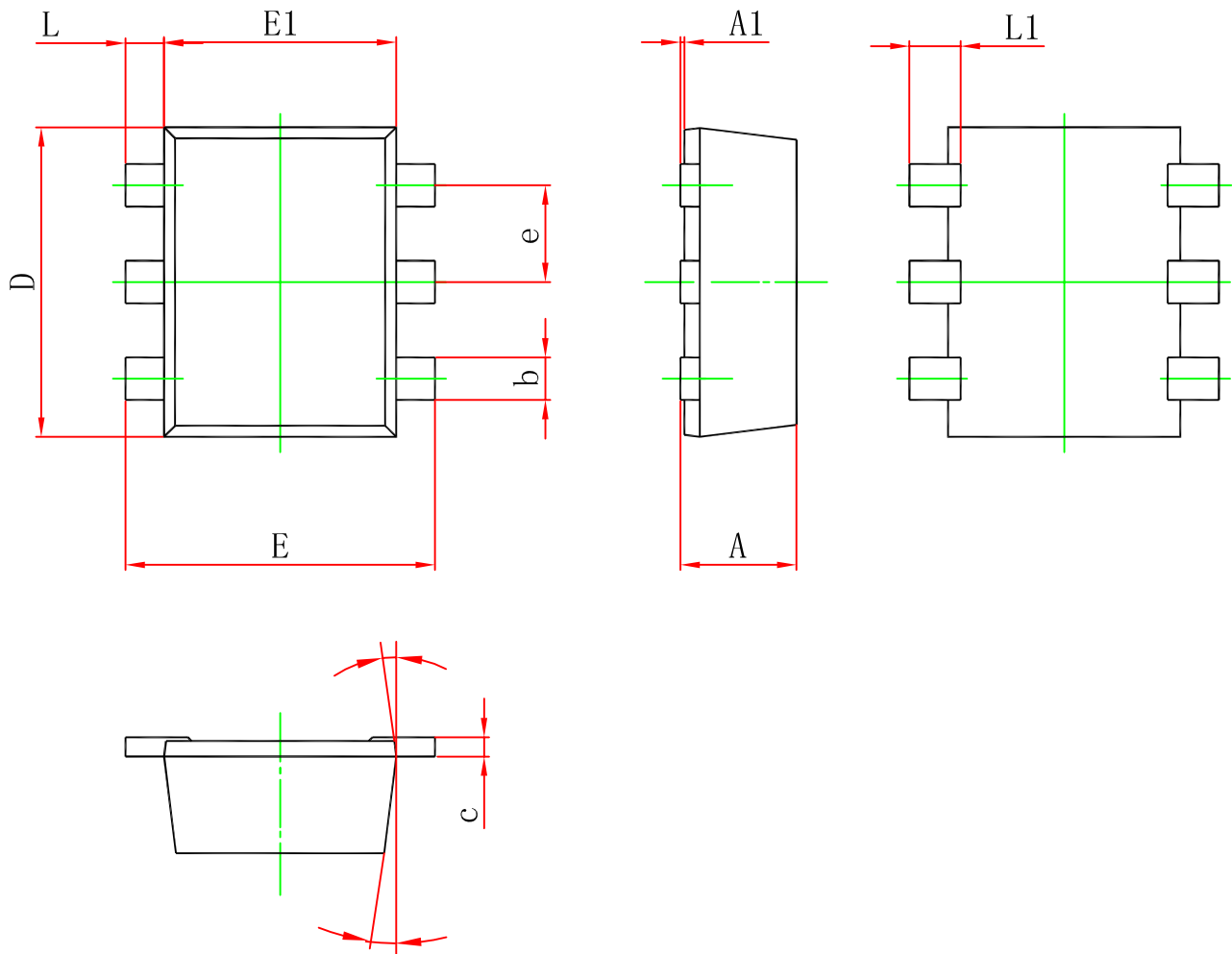
Transient thermal response (Junction-to-Ambient)

PMOS 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

Single pulse power

Safe operating power

Gate Charge Characteristics



Transient thermal response (Junction-to-Ambient)

Package Outline Dimension
SOT-563


Symbol	Dimensions In Millimeters		Dimensions in inches	
	Min.	Max.	Min.	Max.
A	0.525	0.600	0.021	0.024
A1	0.000	0.050	0.000	0.002
e	0.450	0.550	0.018	0.022
c	0.090	0.160	0.004	0.006
D	1.500	1.700	0.059	0.067
b	0.170	0.270	0.007	0.011
E1	1.100	1.300	0.043	0.051
E	1.500	1.700	0.059	0.067
L	0.100	0.300	0.004	0.012
L1	0.200	0.400	0.008	0.016
θ	7 °REF.		7 °REF.	