

WCM2070

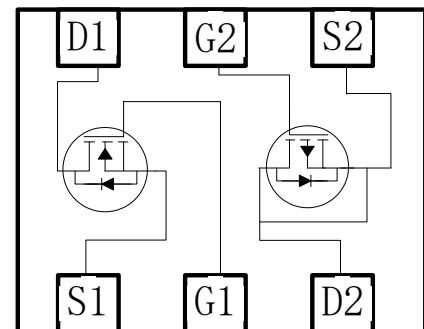
N- and P-Channel Complementary, 12V,MOSFET

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

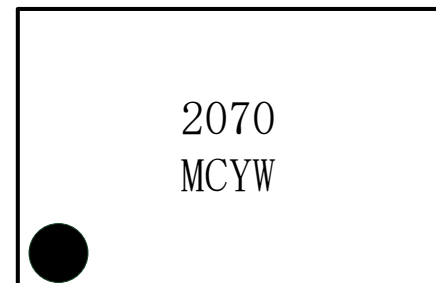
	V _{DS} (V)	Typical R _{DS(on)} (Ω)
N-Channel	12	0.028@ V _{GS} =4.5V
		0.035@ V _{GS} =2.5V
		0.046@ V _{GS} =1.8V
P-Channel	-12	0.057@V _{GS} = - 4.5V
		0.087@V _{GS} = -2.5V
		0.140@V _{GS} = -1.8V



DFN2*2-6L



Pin configuration (Top View)



2070 = Device Code
MC = Special Code
YW = Date Code
Marking

Descriptions

The WCM2070 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 R_{DS(ON)} with low gate charge. Standard Product WCM2070 is Pb-free and Halogen-free..

Features

- Trench Technology
- Supper high density cell design
- Excellent ON resistance
- Extremely Low Threshold Voltage
- Small package DFN2*2-6L

Applications

- Power supply converters circuit
- Load/Power Switching for portable device

Order Information

Device	Package	Shipping
WCM2070-6/TR	DFN2*2-6L	3000/Tape&Reel

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

Symbol	Parameter			N-Channel	P-Channel	Unit
V _{DSS}	Drain-to-Source Voltage			12	-12	V
V _{GSS}	Gate-to-Source Voltage			±8	±8	V
I _D	Continuous Drain Current ^{a d}	t ≤ 10 s	T _A =25°C	5.1	-4.0	A
			T _A =70°C	4.0	-3.2	
		Steady State	T _A =25°C	4.4	-3.4	
			T _A =70°C	3.5	-2.7	
I _{DM}	Pulsed Drain Current ^c			17.6	-13.6	A
P _D	Power Dissipation ^{a d}	t ≤ 10 s	T _A =25°C	1.8		W
			T _A =70°C	1.15		
		Steady State	T _A =25°C	1.37		
			T _A =70°C	0.87		
T _J	Operation junction temperature			-55~150		°C
T _{stg}	Storage temperature range			-55~150		°C

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

Parameter		Symbol	Typical	Maximum	Unit
Junction-to-Ambient Thermal Resistance ^a	$t \leq 10 \text{ s}$	$R_{\theta JA}$	55	69	$^{\circ}\text{C/W}$
	Steady State		70	91	
Junction-to-Ambient Thermal Resistance ^b	$t \leq 10 \text{ s}$	$R_{\theta JA}$	88	115	
	Steady State		125	179	
Junction-to-Case Thermal Resistance	Steady State	$R_{\theta JC}$	34	44	

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

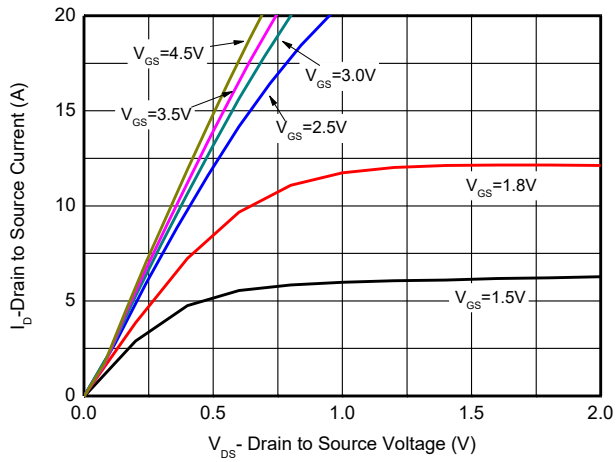
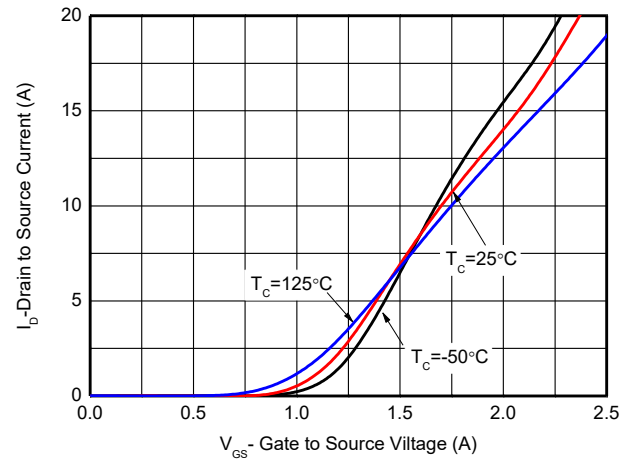
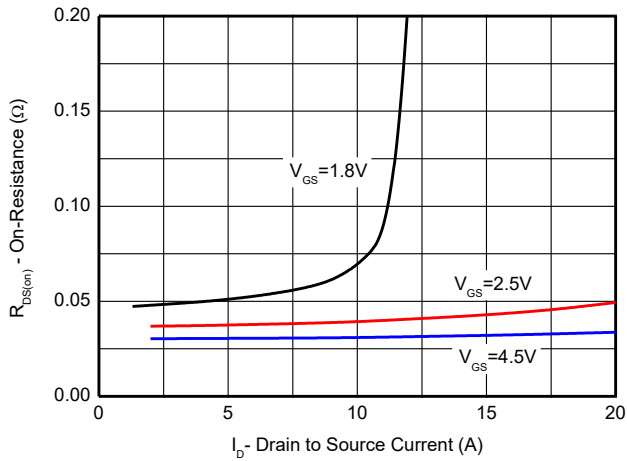
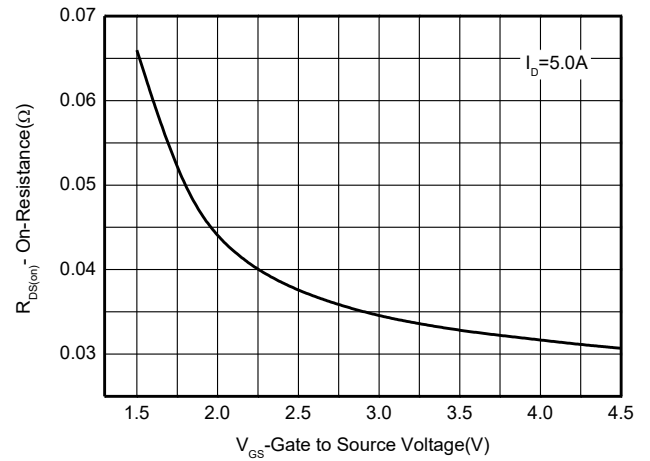
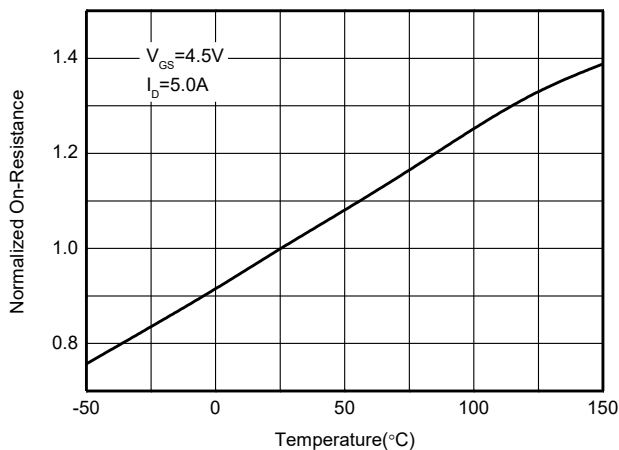
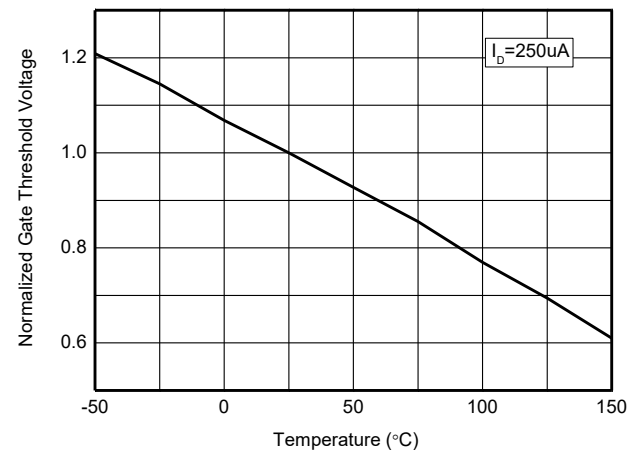
c Pulse width<380 μs , Duty Cycle<2%

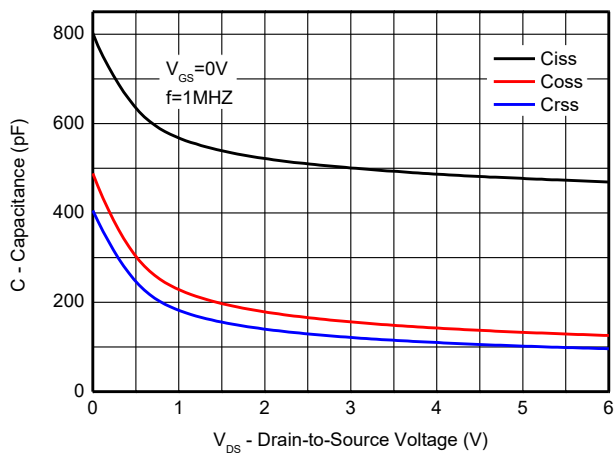
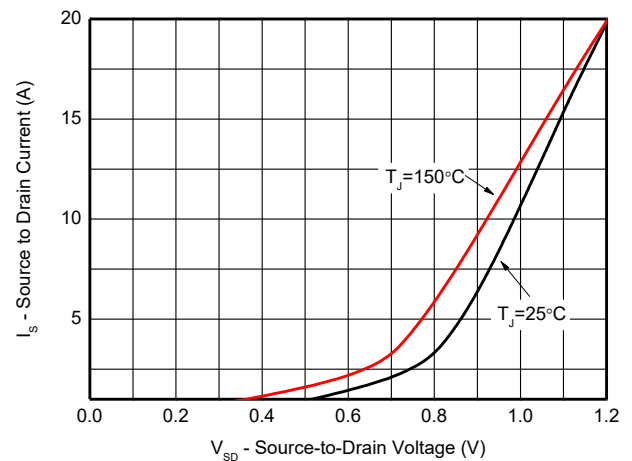
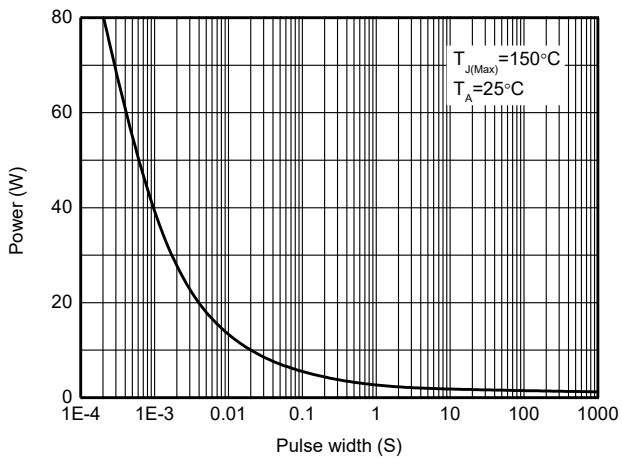
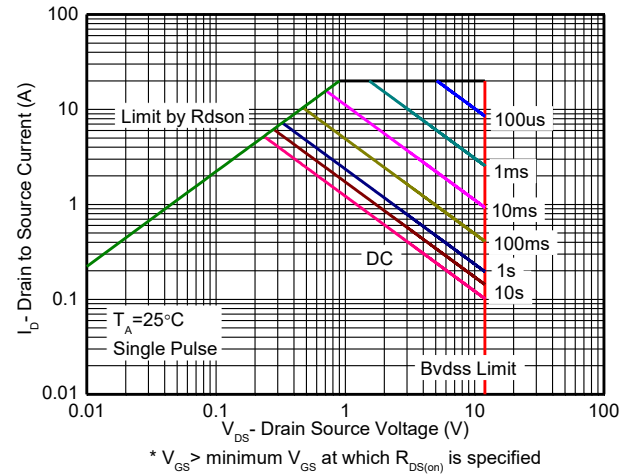
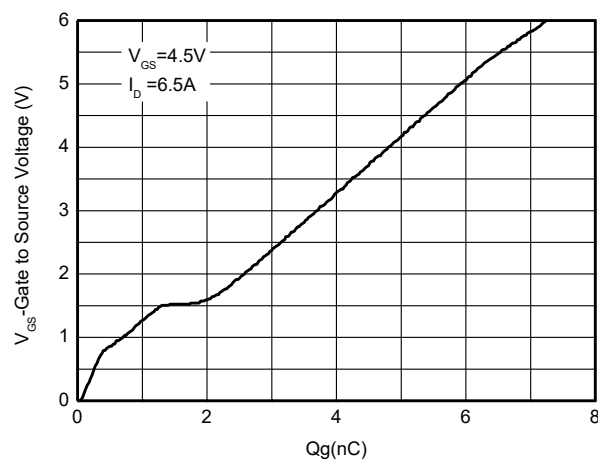
d Maximum junction temperature $T_J=150^{\circ}\text{C}$.

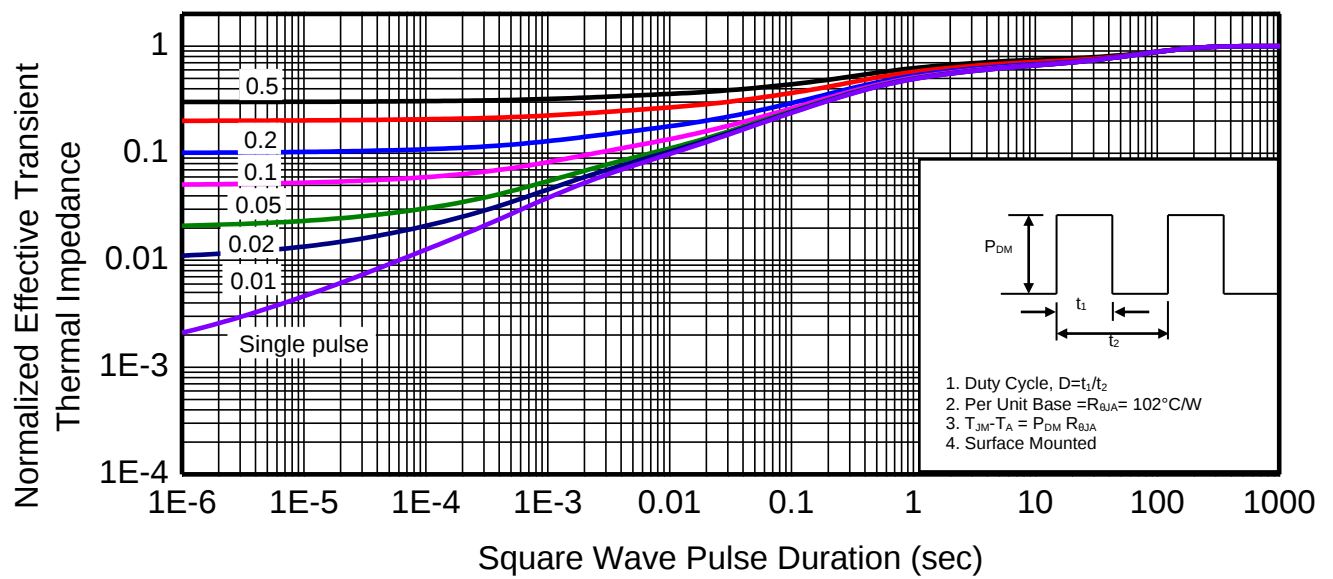
Electronics Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Condition		Min	Typ.	Max	Unit	
Off Characteristics								
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	N-Ch	12			V	
		$V_{GS}=0V, I_D=-250\mu A$	P-Ch	-12				
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=10V, V_{GS}=0V$	N-Ch			1	μA	
		$V_{DS}=-10V, V_{GS}=0V$	P-Ch			-1		
I_{GSS}	Gate –Source leakage current	$V_{DS}=0V, V_{GS}=\pm 8V$	N-Ch			± 1	μA	
			P-Ch			± 1		
ON Characteristics								
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}= V_{GS}, I_D=250\mu A$	N-Ch		0.70	1.2	V	
		$V_{DS}= V_{GS}, I_D=-250\mu A$	P-Ch		-0.80	-1.2		
$R_{DS(on)}$	Drain-Source On-Resistance	$V_{GS}=4.5V, I_D=5.0A$	N-Ch		28	46	$m\Omega$	
		$V_{GS}=-4.5V, I_D=-3.6A$	P-Ch		57	75		
		$V_{GS}=2.5V, I_D=4.6A$	N-Ch		35	66		
		$V_{GS}=-2.5V, I_D=-3.2A$	P-Ch		87	110		
		$V_{GS}=1.8V, I_D=4.1A$	N-Ch		46	80		
		$V_{GS}=-1.8V, I_D=-1.0A$	P-Ch		140	171		
Dynamic Characteristics								
C_{iss}	Input Capacitance	Nmos: $V_{DS}=6V, V_{GS}=0V,$ $f=1MHz$	N-Ch		469		pF	
			P-Ch		673			
C_{oss}	Output Capacitance	Pmos: $V_{DS}=-6V, V_{GS}=0V,$ $f=1MHz$	N-Ch		125			
			P-Ch		175			
C_{rss}	Reverse Transfer Capacitance	$V_{DS}=-6V, V_{GS}=0V,$ $f=1MHz$	N-Ch		95		pF	
			P-Ch		162			
$Q_{G(TOT)}$	Total Gate Charge	Nmos: $V_{DD}=10V, V_{GS}=4.5V,$ $I_D=6.5A$	N-Ch		5.38		nC	
			P-Ch		6.56			
$Q_{G(TH)}$	Threshold gate charge	Nmos: $V_{DD}=10V, V_{GS}=4.5V,$ $I_D=6.5A$	N-Ch		0.72			
			P-Ch		0.81			
Q_{GS}	Gate-Source Charge	Pmos: $V_{DD}=-10V, V_{GS}=-4.5V$ $I_D=-4.3A$	N-Ch		1.3			
			P-Ch		1.2			
Q_{GD}	Gate-Drain Charge	Pmos: $V_{DD}=-10V, V_{GS}=-4.5V$ $I_D=-4.3A$	N-Ch		0.76			
			P-Ch		2.1			
$t_{d(on)}$	Turn-On Delay Time	Nmos: $V_{DD}=6V, V_{GS}=4.5V,$ $I_D=5.2A, R_G=1\Omega$	N-Ch		20		ns	
			P-Ch		30			
t_r	Turn-On Rise Time	Nmos: $V_{DD}=6V, V_{GS}=4.5V,$ $I_D=5.2A, R_G=1\Omega$	N-Ch		22			
			P-Ch		32			
$t_{d(off)}$	Turn-Off Delay Time	Pmos: $V_{DD}=-6V, I_D=-3.8A,$ $V_{GS}=-4.5V, R_G=1\Omega$	N-Ch		48			
			P-Ch		62			
t_f	Turn-Off Fall Time	Pmos: $V_{DD}=-6V, I_D=-3.8A,$ $V_{GS}=-4.5V, R_G=1\Omega$	N-Ch		15			
			P-Ch		18			

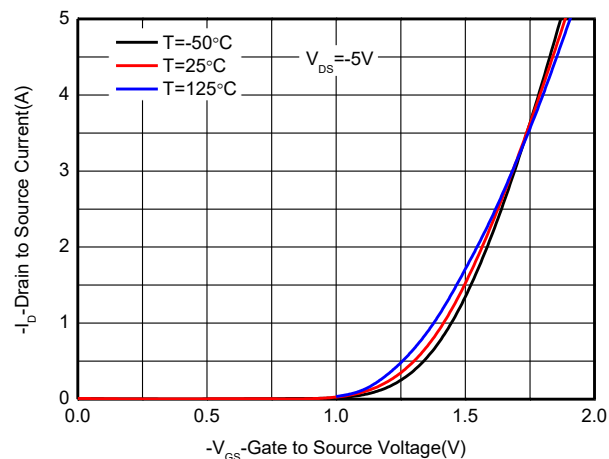
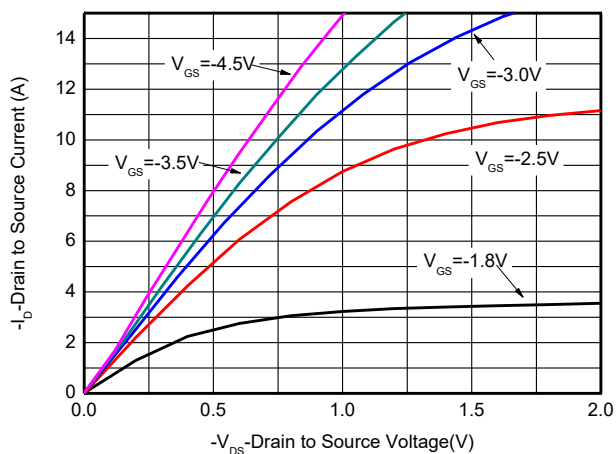
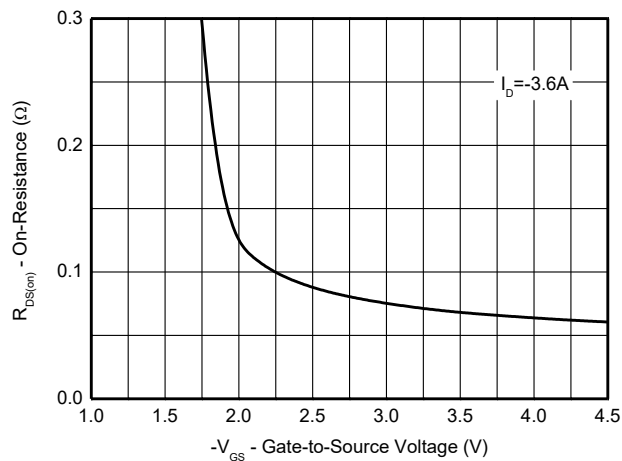
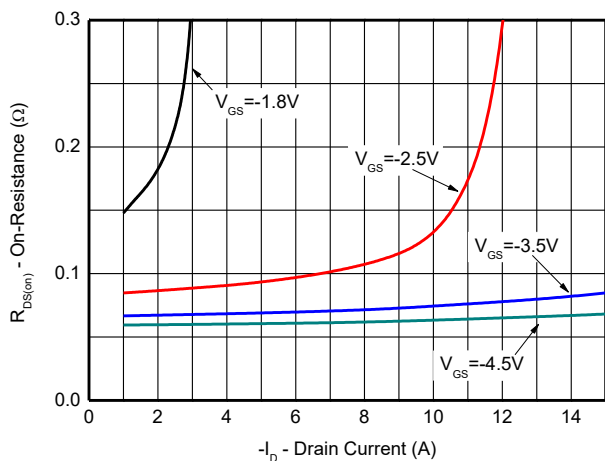
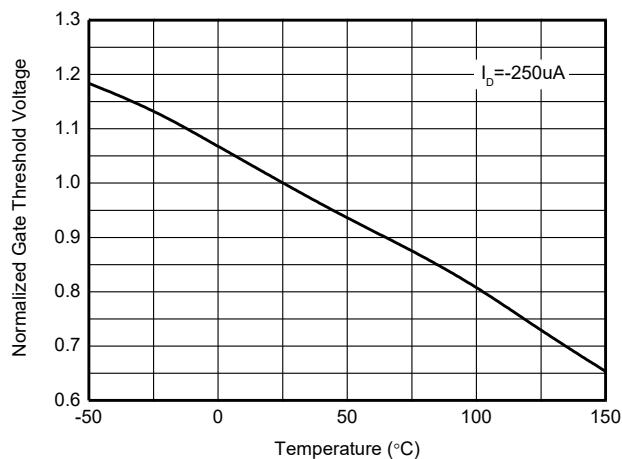
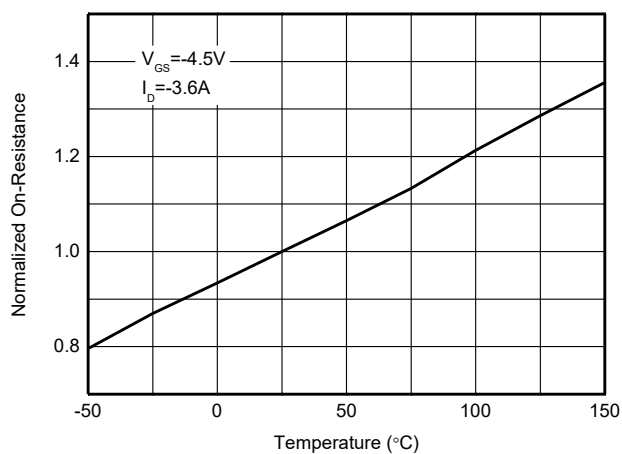
BODY DIODE CHARACTERISTICS								
Forward Voltage	V _{SD}	V _{GS} = 0 V, I _S = 5.2A	N-Ch		0.7	1.5	V	
		V _{GS} = 0 V, I _S =-3.4A	P-Ch		-0.8	-1.5		
Body-Diode Continuous Current	I _S	Nmos: I _F =5.2A,dI/dt=100A/us V _{GS} =0V (NOTE C) Pmos: I _F =-3.8A,dI/dt=-100A/us V _{GS} =0V (NOTE C)	N-Ch			5.3	A	
			P-Ch			-4.1		
Body-Diode Pulsed Current	I _{SM}		N-Ch			20	A	
			P-Ch			-15		
Body Diode Reverse Recovery Time	T _{rr}		N-Ch			18	50	nS
			P-Ch			27	65	
Body Diode Reverse Recovery Charge	Q _{rr}		N-Ch			4.5	10	uC
			P-Ch			11	25	
Reverse Recovery Fall Time	t _a	N-Ch			7		nS	
		P-Ch			15			
Reverse Recovery Rise Time	t _b	N-Ch			11			
		P-Ch			12			

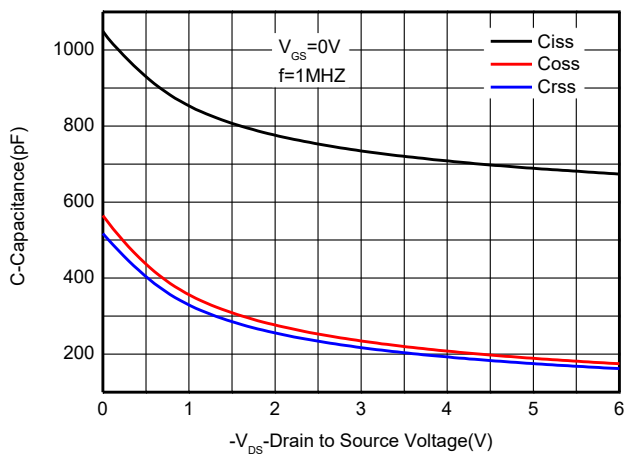
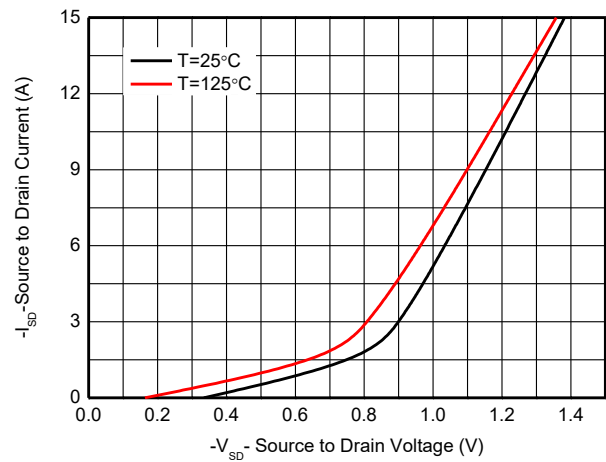
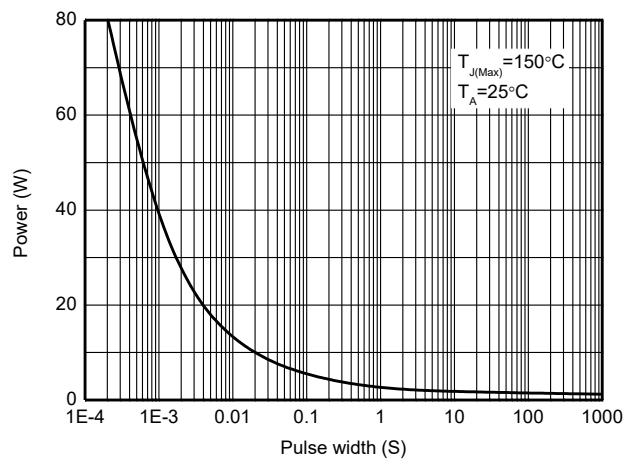
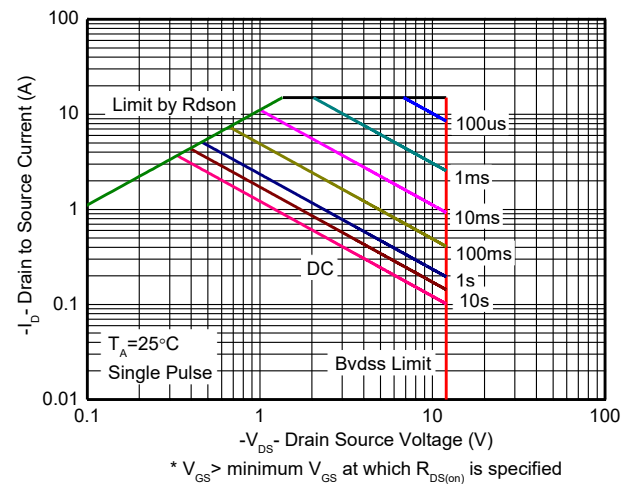
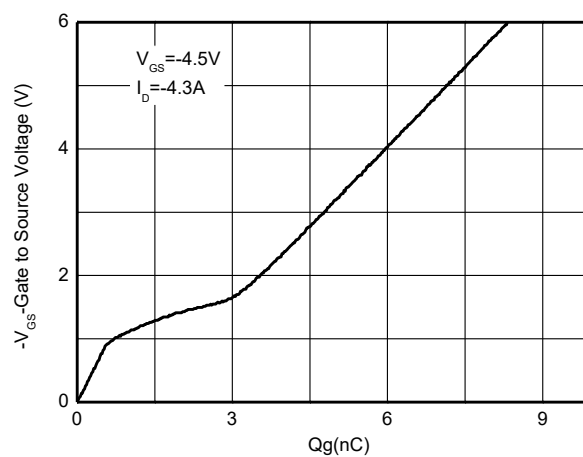
Typical Characteristics (N-Channel)
 $T_A=25^\circ\text{C}$, unless otherwise noted)

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

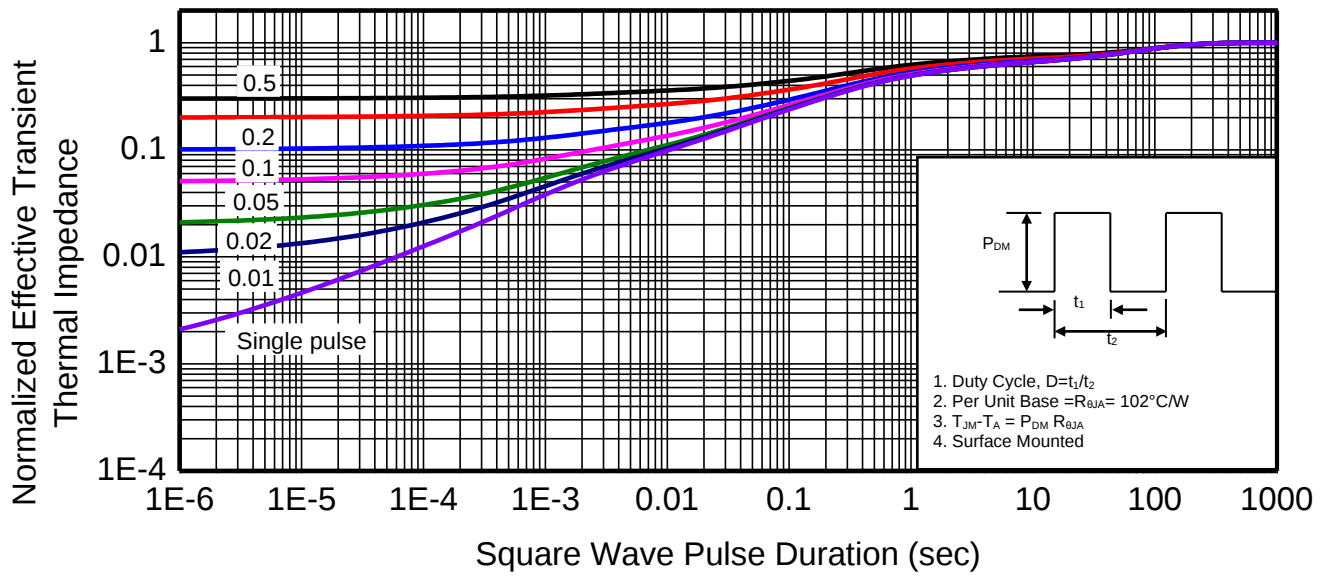

Capacitance

Body Diode Forward Voltage

Single pulse power

Safe operating power

Gate charge Characteristics



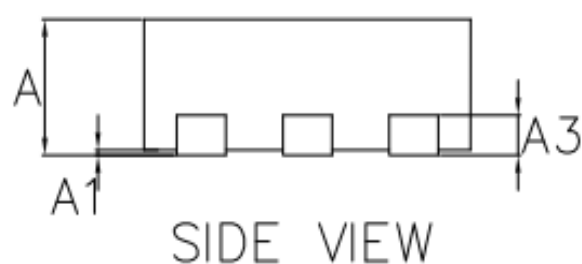
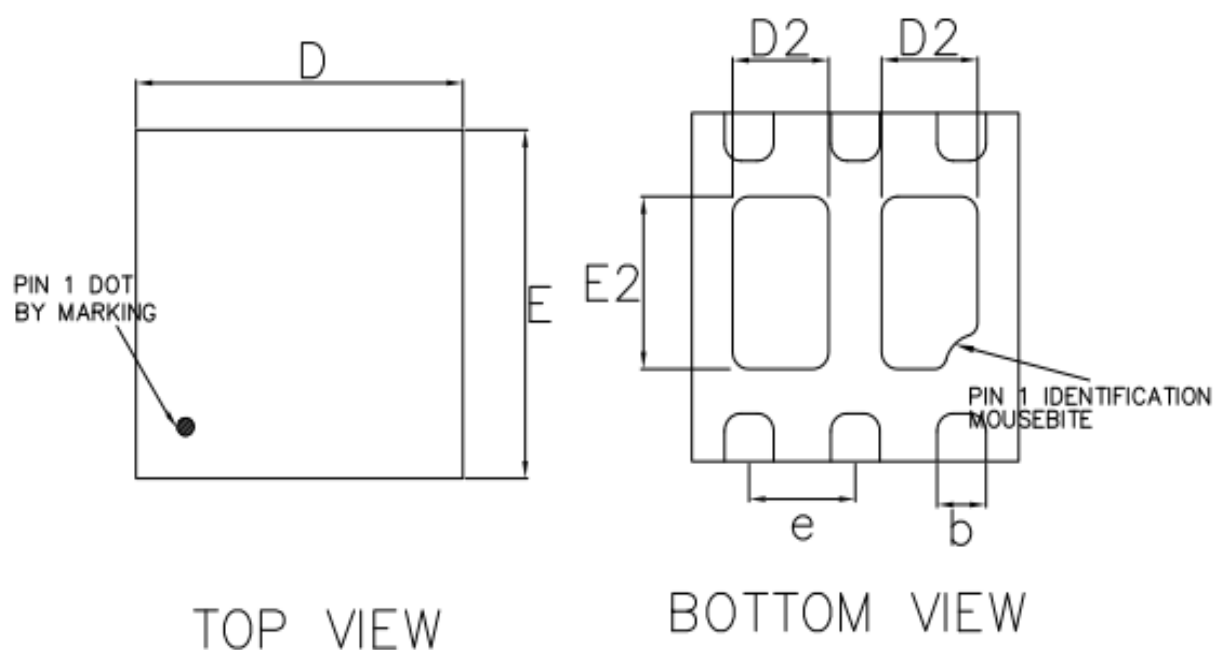
Transient thermal response (Junction-to-Ambient)

Typical Characteristics (P-Channel)
 $T_A=25^{\circ}\text{C}$, 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


Capacitor

Body diode forward voltage

Single pulse power (Junction-to-ambient)

Safe operating power

Gate charge Characteristics



Transient thermal response (Junction-to-Ambient)

Package Outline Dimension
DFN2*2-6L


COMMON DIMENSIONS(MM)			
PKG. REF.	W: VERY VERY THIN		
	MIN.	NOM.	MAX
A	0.70	0.75	0.80
A1	0.00	—	0.05
A3	0.20 REF.		
D	1.95	2.00	2.05
E	1.95	2.00	2.05
D2	0.44	0.59	0.69
E2	0.84	0.99	1.09
b	0.25	0.30	0.35
L	0.175	0.275	0.375
e	0.65 BSC		