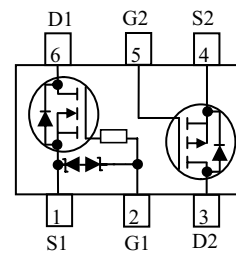
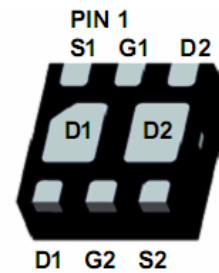


WCM2001

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

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

$V_{(BR)DSS}$	$R_{DS(on)}$ Typ. (m Ω)
N-Channel 20 V	180 @ 4.5V
	225 @ 2.5V
	280 @ 1.8V
P-Channel -20 V	85 @ -4.5V
	110 @ -2.5V
	150 @ -1.8V



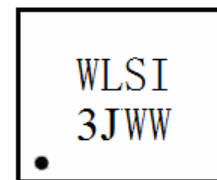
Pin configuration (Top view)

Descriptions

The WCM2001 is the N- and P-Channel enhancement MOS Field Effect Transistor as a single package for DC-DC converter or Load switch applications, uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. Standard Product WCM2001 is Pb-free.

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 DFN2x2-6L.



WLSI = Company
3J = Device Code
WW = Week Code

Marking

Order Information

Device	Package	Shipping
WCM2001-6/TR	DFN2x2-6L	3000/Tape&Reel

Applications

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

Absolute Maximum Ratings

 (T_A=25°C unless otherwise noted)

Symbol	Parameter	N-Channel	P-Channel	Unit
V _{DSS}	Drain-to-Source Voltage	20	-20	V
V _{GSS}	Gate-to-Source Voltage	±6	±8	V
I _D	Drain Current – Continue Note1	0.65	-3.1	A
	Drain Current – Pulsed (t<300us, Duty<2%) Note1	1.4	-4.1	A
P _D	Power Dissipation – Note1	1.5		W
	Power Dissipation – Note2	0.7		
T _J	Operation junction temperature range	150		°C
T _{SG}	Storage temperature range	-55~150		°C

Thermal Resistance Ratings

 (T_A=25°C unless otherwise noted)

Symbol	Parameter	Single Operation		Dual Operation		Unit
		Typ.	Max.	Typ.	Max.	
R _{θJA}	Thermal Resistance, Junction to Ambient – Note1	65	82	52	65	°C/W
R _{0JA}	Thermal Resistance, Junction to Ambient – Note2	145	175	116	140	°C/W

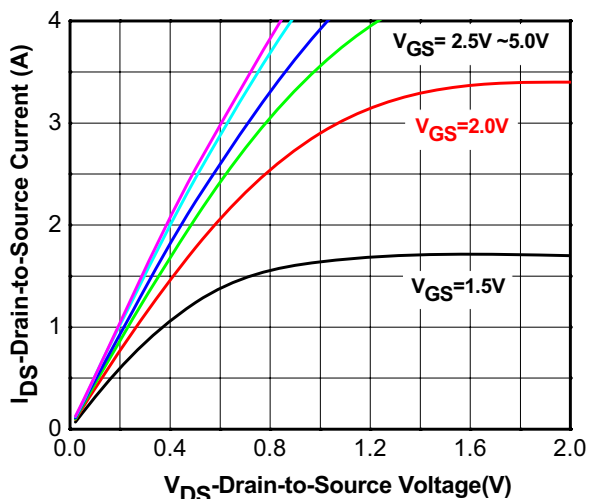
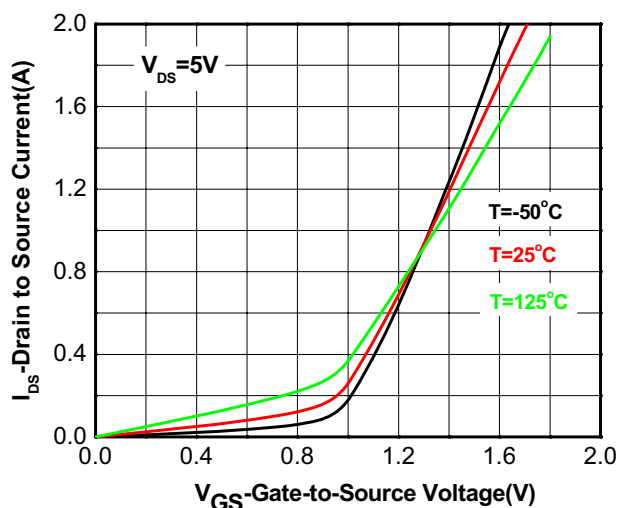
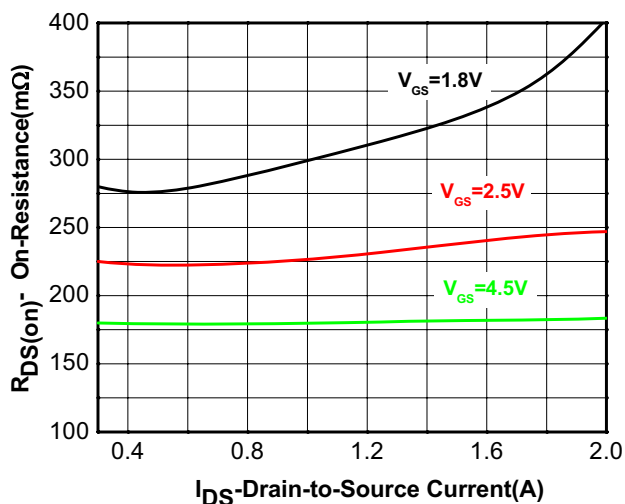
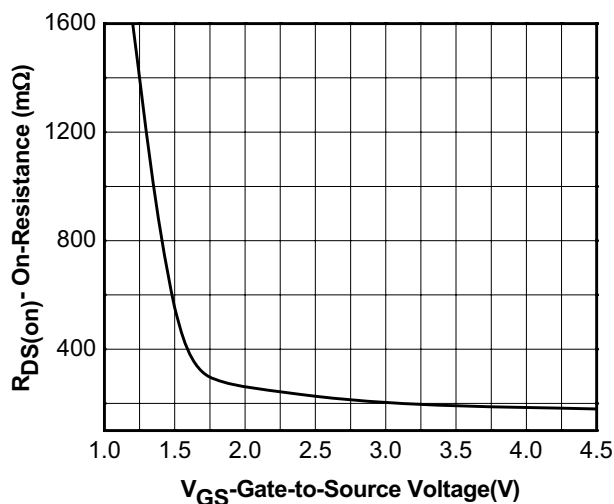
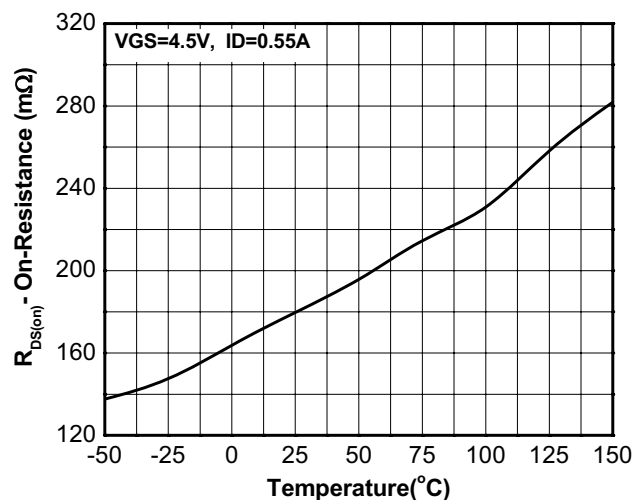
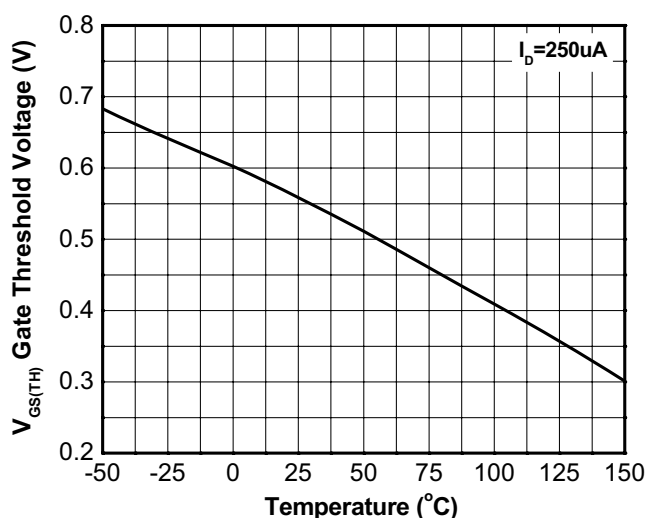
Note1: Surface mounted on a 2 oz copper, 1 in² pad, FR-4 board.

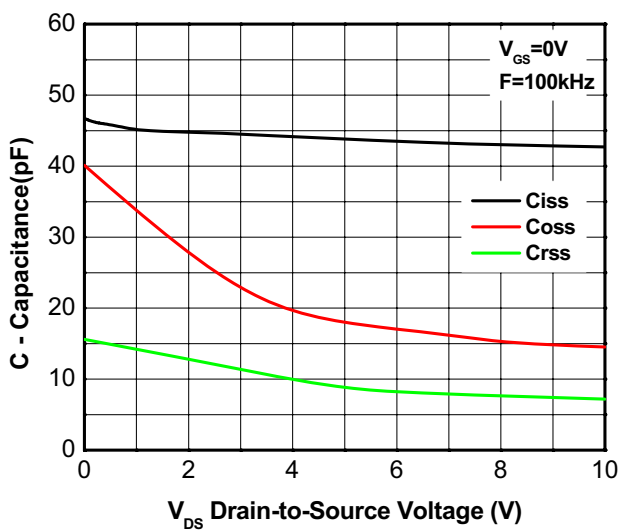
Note2: Surface mounted on a 2 oz copper, minimum pad, FR-4 board

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

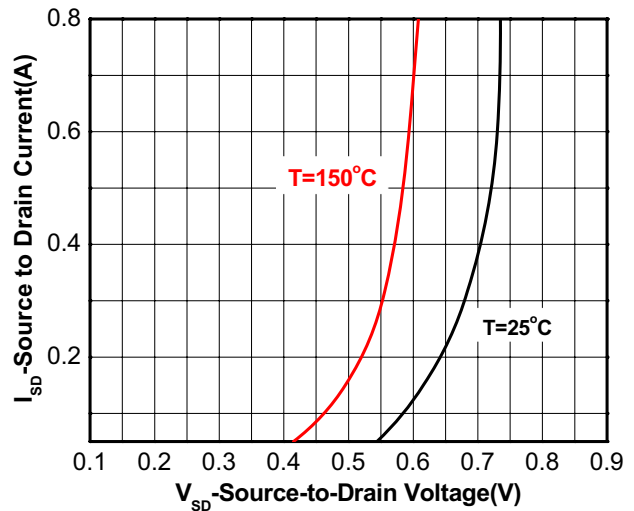
Symbol	Parameter	Test Condition	Min	Typ.	Max	Unit	
Off Characteristics							
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	N-Ch	20		V	
		$V_{GS}=0V, I_D=-250\mu A$	P-Ch	-20			
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=16V, V_{GS}=0V$	N-Ch		1	uA	
		$V_{DS}=-16V, V_{GS}=0V$	P-Ch		-1		
I_{GSS}	Gate –Source leakage current	$V_{DS}=0V, V_{GS}=\pm 5V$	N-Ch		± 5	uA	
		$V_{DS}=0V, V_{GS}=\pm 8V$	P-Ch		± 0.1		
ON Characteristics							
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	N-Ch	0.4	0.55	0.85	V
		$V_{DS}=V_{GS}, I_D=-250\mu A$	P-Ch	-0.4	-0.56	-1.00	
$R_{DS(on)}$	Drain-Source On-Resistance	$V_{GS}=4.5V, I_D=0.55A$	N-Ch		180	310	m Ω
		$V_{GS}=-4.5V, I_D=-3.1A$	P-Ch		85	120	
		$V_{GS}=2.5V, I_D=0.45A$	N-Ch		225	360	
		$V_{GS}=-2.5V, I_D=-2.8A$	P-Ch		110	150	
		$V_{GS}=1.8V, I_D=0.35A$	N-Ch		280	460	
		$V_{GS}=-1.8V, I_D=-1.5A$	P-Ch		150	200	
g_{FS}	Forward Transconductance	$V_{DS}=5V, I_D=0.55A$	N-Ch		2.0	S	
		$V_{DS}=-5V, I_D=-0.45A$	P-Ch		12		
Dynamic Characteristics							
C_{iss}	Input Capacitance	NMOS: $V_{DS}=10V,$ $V_{GS}=0V, F=100kHz$ PMOS: $V_{DS}=-10V,$ $V_{GS}=0V, F=1MHz$	N-Ch		50	pF	
C_{oss}	Output Capacitance		P-Ch		470		
			N-Ch		13		
C_{rss}	Reverse Transfer Capacitance		P-Ch		55		
			N-Ch		8		
			P-Ch		50		
$Q_{G(TOT)}$	Total Gate Charge	NMOS: $V_{DS}=10V,$ $V_{GS}=4.5V, I_D=0.55A$ PMOS: $V_{DS}=-10V,$ $V_{GS}=-4.5V, I_D=-2.7A$	N-Ch		1.15	nC	
$Q_{G(TH)}$	Threshold gate charge		P-Ch		6		
			N-Ch		0.06		
Q_{GS}	Gate-Source Charge		P-Ch		0.34		
			N-Ch		0.15		
Q_{GD}	Gate-Drain Charge		P-Ch		0.75		
			N-Ch		0.23		
			P-Ch		1.2		

Symbol	Parameter	Test Condition	Min	Typ.	Max	Unit	
Switching Characteristics							
td(on)	Turn-On Delay Time	NMOS: $V_{DD}=10V$, $R_L=18\Omega$, $V_{GEN}=4.5V$, $I_D=0.55A$, $R_G=6\Omega$ PMOS: $V_{DD}=-10V$, $R_L=3.7\Omega$, $V_{GEN}=-4.5V$, $I_D=-2.7A$, $R_G=6\Omega$	N-Ch	22		ns	
			P-Ch	9			
tr	Turn-On Rise Time		N-Ch	80			
			P-Ch	7			
td(off)	Turn-Off Delay Time		N-Ch	700			
			P-Ch	40			
tf	Turn-Off Fall Time	N-Ch	380				
		P-Ch	7				
Drain-to-Source Diode Characteristics							
V _{SD}	Forward Diode Voltage	$V_{GS}=0V$, $I_S=0.15A$	N-Ch	0.5	0.70	1.5	V
		$V_{GS}=0V$, $I_S=-0.9A$	P-Ch	-0.5	-0.70	-1.5	

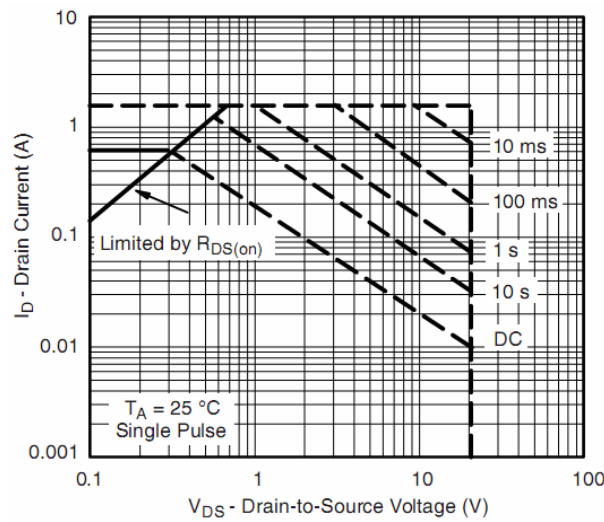
Typical Performance Graph (N-Channel)

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



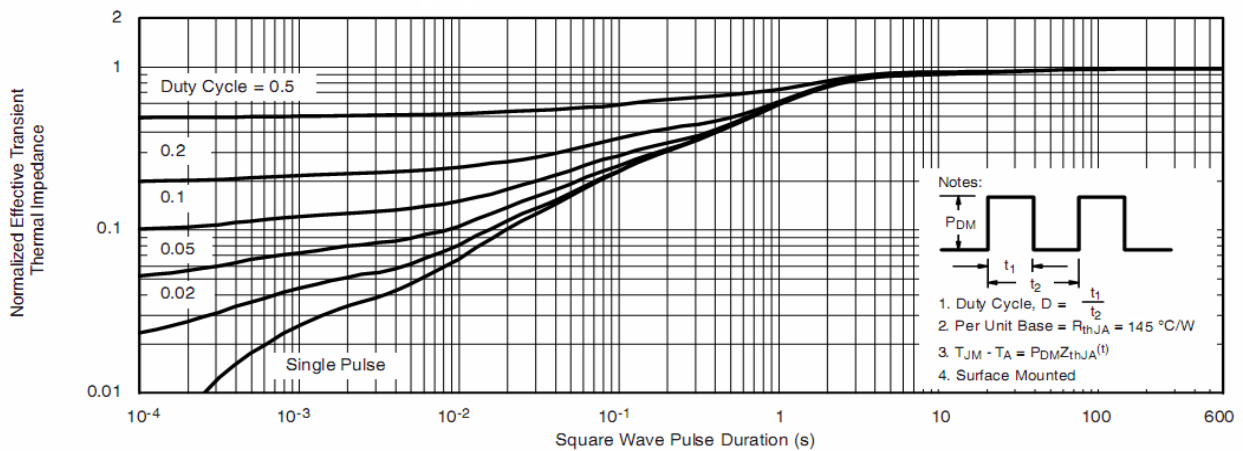
Capacitance



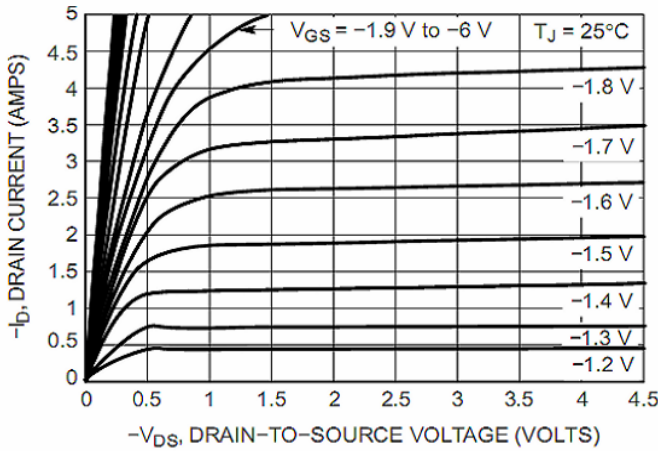
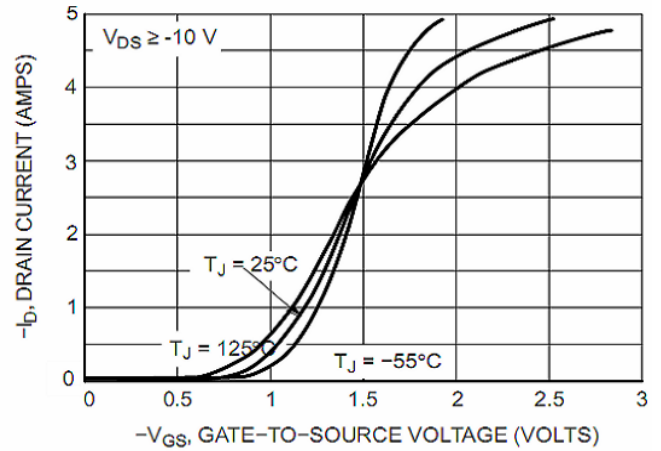
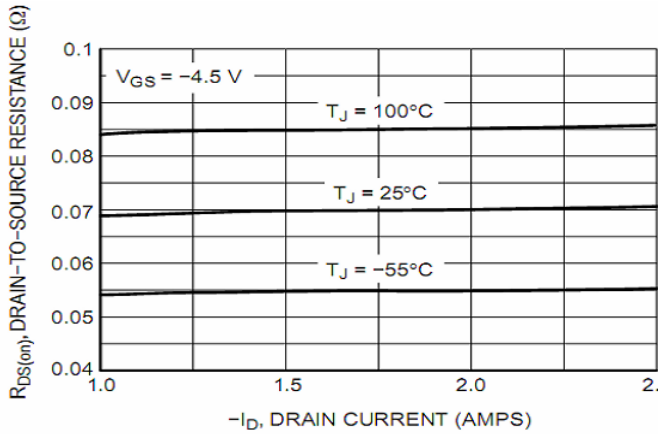
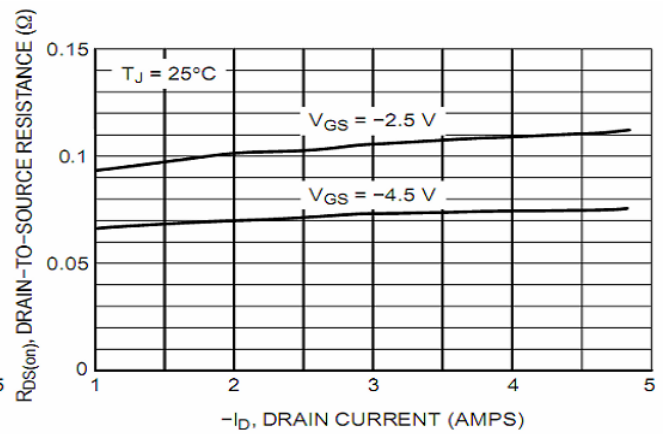
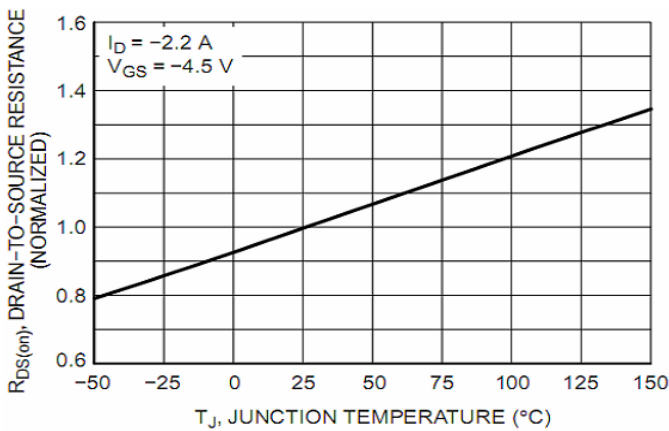
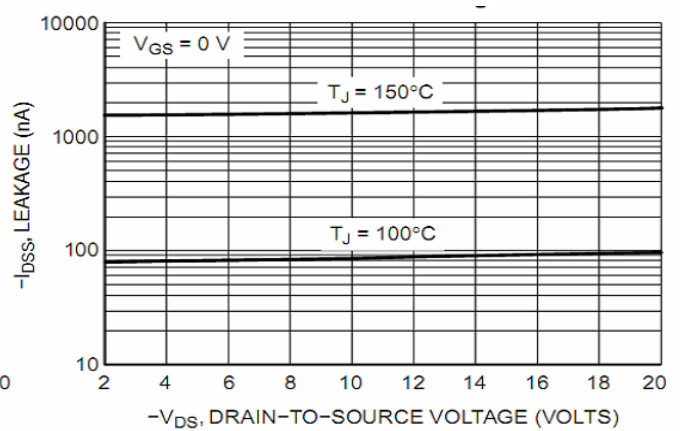
Body diode forward voltage

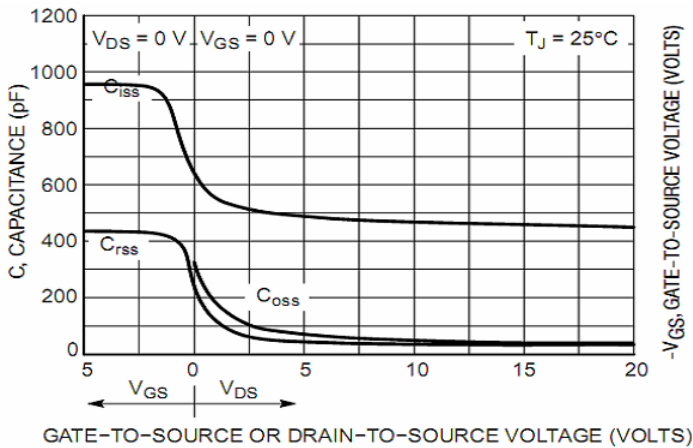


Safe operating power

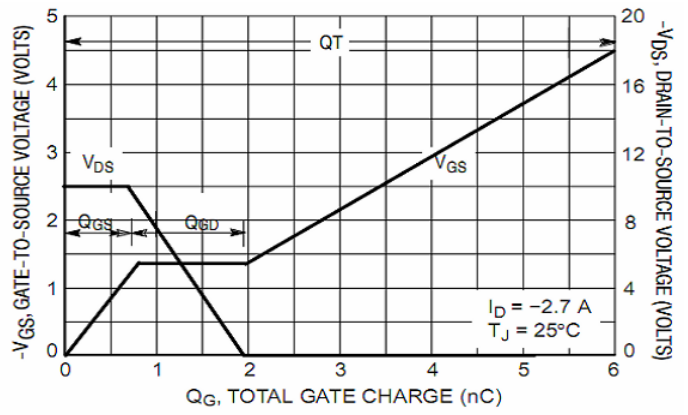


Normalized Thermal Transient Impedance, Junction-to-Ambient

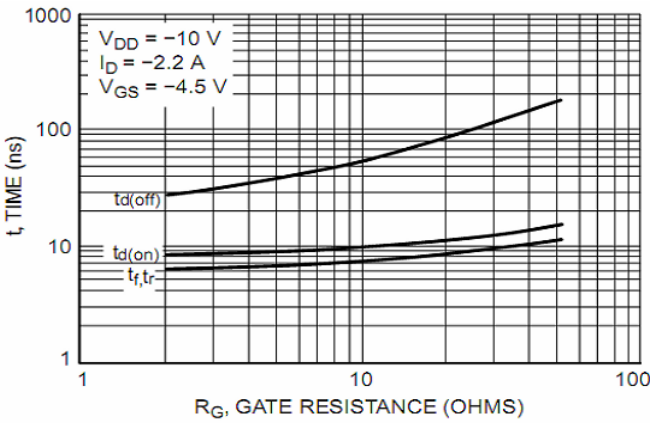
Typical Performance Graph (P-Channel)

On-Region Characteristics

Transfer Characteristics

On-Resistance versus Drain Current

On-Resistance versus Drain Current and Gate Voltage

On-Resistance Variation with Temperature

Drain-to-Source Leakage Current versus Voltage



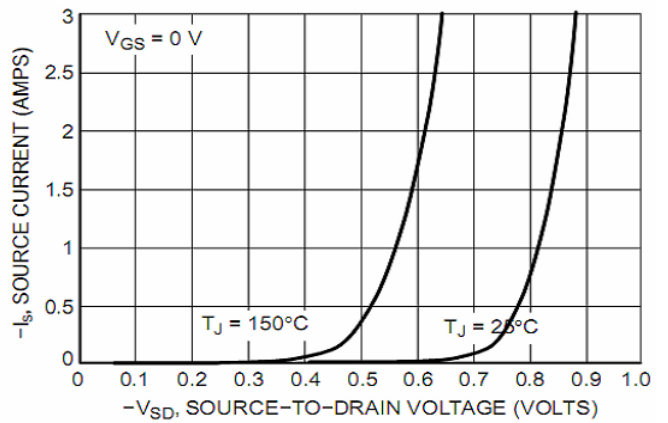
Capacitance Variation



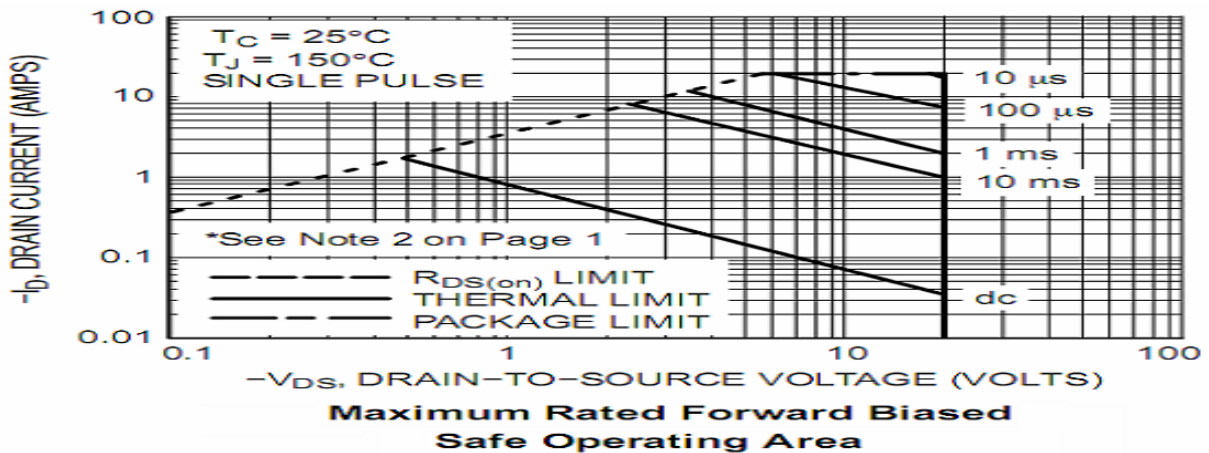
Gate-To-Source and Drain-To-Source Voltage versus Total Charge

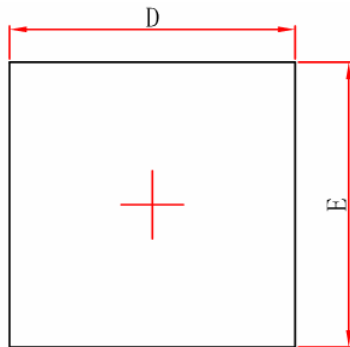
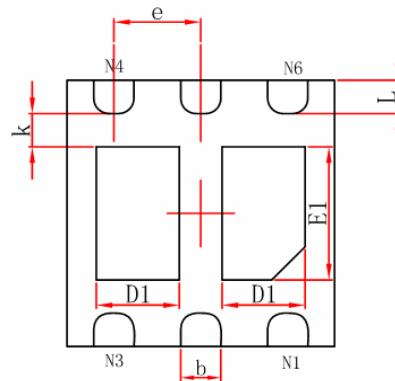
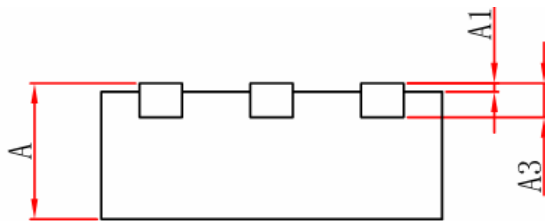


Resistive Switching Time Variation versus Gate Resistance



Diode Forward Voltage versus Current



Package Outline Dimension
DFN2x2-6L Dual

Top View

Bottom View

Side View

Symbol	Dimension in Millimeters	
	Min.	Max.
A	0.700	0.800
A1	0.000	0.050
A3	0.203REF	
D	1.924	2.076
E	1.924	2.076
D1	0.520	0.720
E1	0.900	1.100
k	0.200MIN	
b	0.250	0.350
e	0.650TYP	
L	0.174	0.326