



**WANSEMI**  
万芯半导体

**WP2060KP3**

# **Enhancement Mode N-Channel Power MOSFET**

PDFN3X3/NMOS/20V/ $\pm 12$ V/0.75V/60A/3.5m $\Omega$

Rev0.6

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## 20V, 3.5mΩ, 60A, Single N-Channel

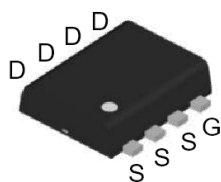
### 1.Features

- ◆ 20V MOSFET technology
- ◆ Low on-state resistance
- ◆ Fast switching
- ◆  $V_{GS} \pm 12V$

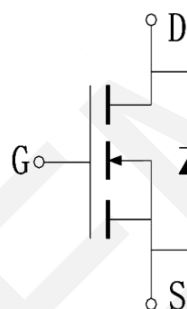
$V_{DS}$	$R_{DS(on)}$ Typ.	$I_D$ Max.
20V	3.1mΩ @ 7.4V	60A
	3.5mΩ @ 4.5V	
	4.7mΩ @ 2.5V	

### 2.Applications

- ◆ Power Switching Application
- ◆ Load Switching



PDFN3X3  
Pin Description



Schematic Diagram

### 3.Package Marking and Ordering Information

Part no.	Marking	Package	PCS/Reel	PCS/CTN.
WP2060KP3	WP2060KP3	PDFN3x3	5,000	50,000

### 4.Absolute Max Ratings at $T_a=25^{\circ}C$ (Note1)

Parameter	Symbol	Maximum	Units
Drain to Source Voltage	$V_{DSS}$	20	V
Gate to Source Voltage	$V_{GSS}$	$\pm 12$	V
Drain Current (DC)	$I_D$	60	A
Drain Current (Pulse), $PW \leq 300\mu s$	$I_{DP}$	240	A
Total Dissipation	$P_D$	83	W
Avalanche Energy, Single Pulsed	$E_{AS}$	110.25	mJ
Junction Temperature	$T_j$	150	$^{\circ}C$
Storage Temperature	$T_{stg}$	-55 to +150	$^{\circ}C$

Note 1: Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### 5. Thermal Resistance Ratings

Parameter	Symbol	Value	Unit
Junction to case	$R_{\theta JC}$	1.8	$^{\circ}\text{C/W}$

Note 2 : When mounted on 1 inch square copper board  $t \leq 10\text{sec}$  The value in any given application depends on the user's specific board design.

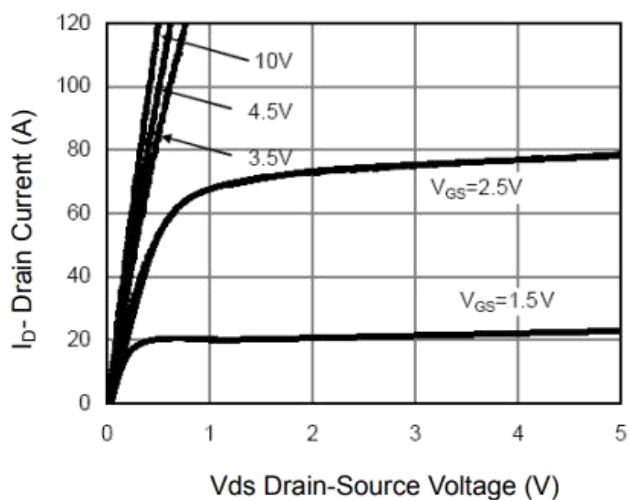
### 6. Electrical Characteristics at $T_a=25^{\circ}\text{C}$ (Note 3)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 250\mu\text{A}$ , $V_{GS} = 0\text{V}$	20	-	-	V
Zero-Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 20\text{V}$ , $V_{GS} = 0\text{V}$	-	-	100	nA
Gate to Source Leakage Current	$I_{GSS}$	$V_{GS} = \pm 12\text{V}$ , $V_{DS} = 0\text{V}$	-	-	$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$ , $I_{DS}=250\mu\text{A}$	0.5	0.75	1.2	V
Static Drain to Source On-State Resistance	$R_{DS(on)}$	$I_D = 20\text{A}$ , $V_{GS} = 7.4\text{V}$	-	3.1	3.7	m $\Omega$
		$I_D = 20\text{A}$ , $V_{GS} = 4.5\text{V}$	-	3.5	4	m $\Omega$
		$I_D = 10\text{A}$ , $V_{GS} = 2.5\text{V}$	-	4.7	9	m $\Omega$
Forward Transconductance	$G_{FS}$	$I_D = 20\text{A}$ , $V_{DS} = 5\text{V}$	20	-	-	S
Input Capacitance	$C_{iss}$	$V_{GS}=0\text{V}$ ,	-	4098	-	pF
Output Capacitance	$C_{oss}$	$V_{DS}=10\text{V}$ ,	-	1519	-	pF
Reverse Transfer Capacitance	$C_{rss}$	Frequency=1.0MHz	-	1238	-	pF
Turn-ON Delay Time	$t_{d(on)}$	$V_{DD} = 10\text{V}$ , $I_D = 20\text{A}$ , $V_{GS} = 10\text{V}$ , $R_{GEN} = 2.7\Omega$	-	6	-	ns
Rise Time	$t_r$		-	4	-	ns
Turn-OFF Delay Time	$t_{d(off)}$		-	31	-	ns
Fall Time	$t_f$		-	5	-	ns
Total Gate Charge	$Q_g$	$V_{DS} = 10\text{V}$ ,	-	15	-	nC
	$Q_{gs}$	$V_{GS} = 4.5\text{V}$ ,	-	3	-	nC
	$Q_{gd}$	$I_D = 20\text{A}$	-	4	-	nC
Diode Forward Voltage	$V_{FSD}$	$I_S = 20\text{A}$ , $V_{GS} = 0$	0.5	0.8	1.2	V

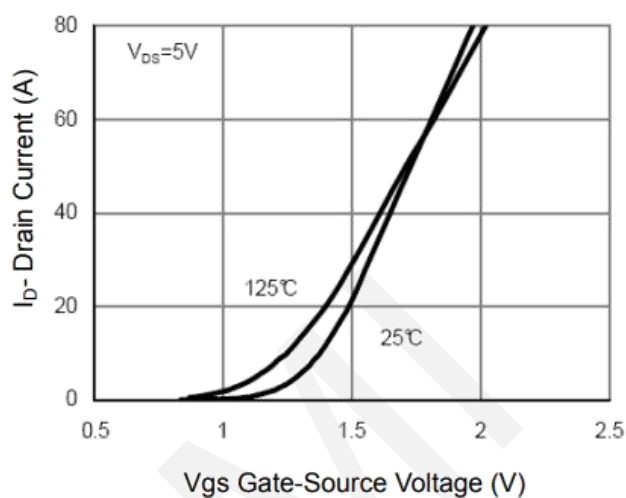
Note 3 : Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.



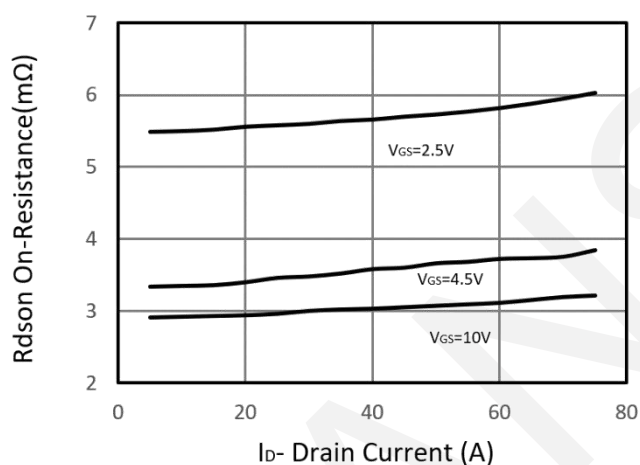
## 7. Typical electrical and thermal characteristics



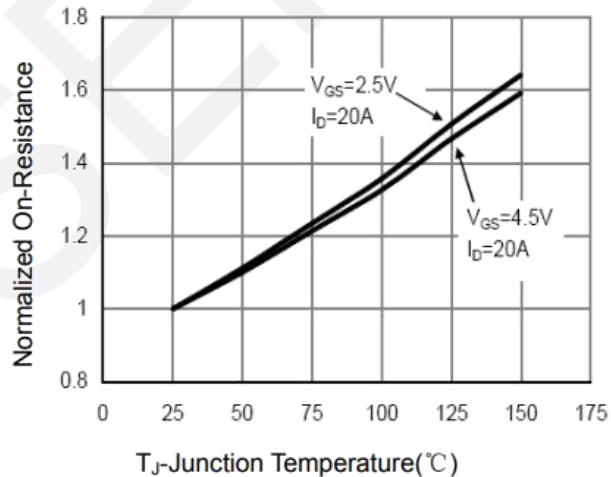
Output Characteristics



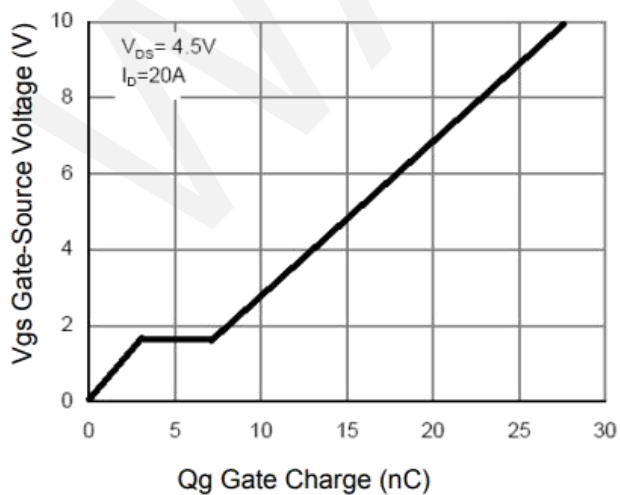
Transfer Characteristics



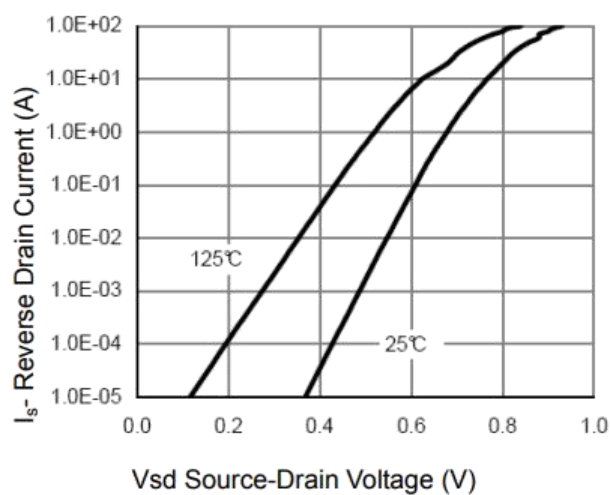
$R_{DS(on)}$ -Drain Current



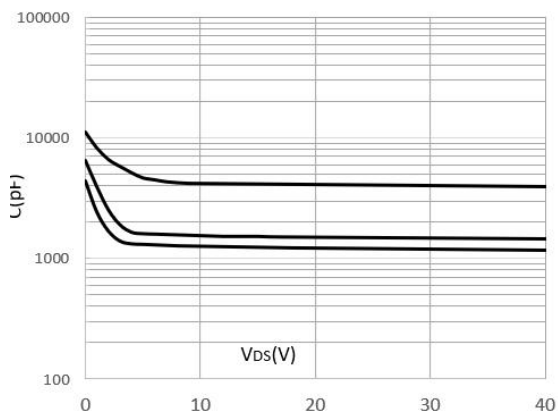
$R_{DS(on)}$ -Junction Temperature



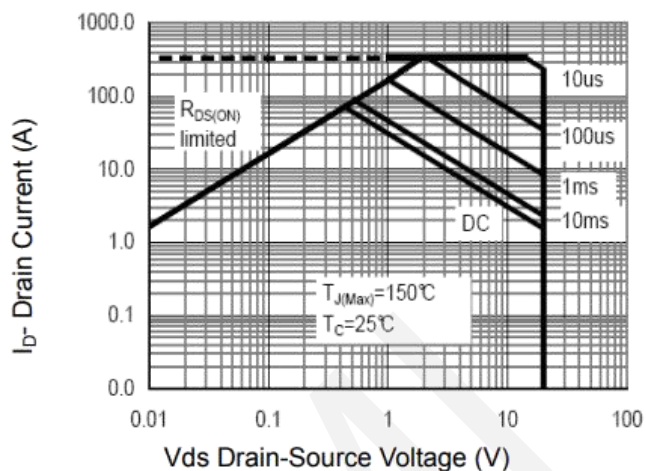
Gate Charge



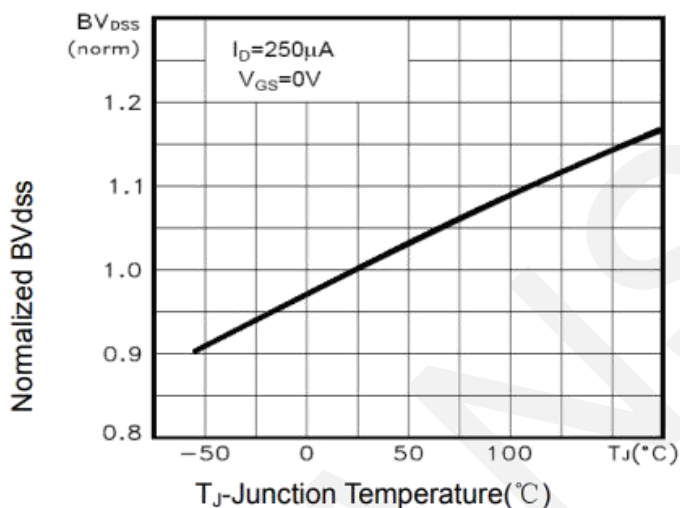
Source-Drain Diode Forward



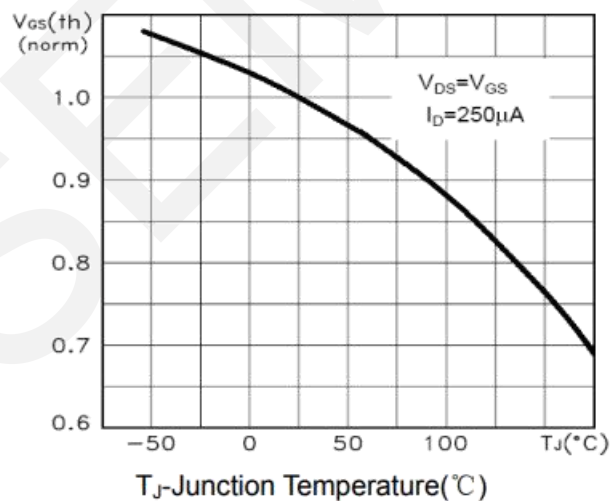
**Capacitance vs Vds**



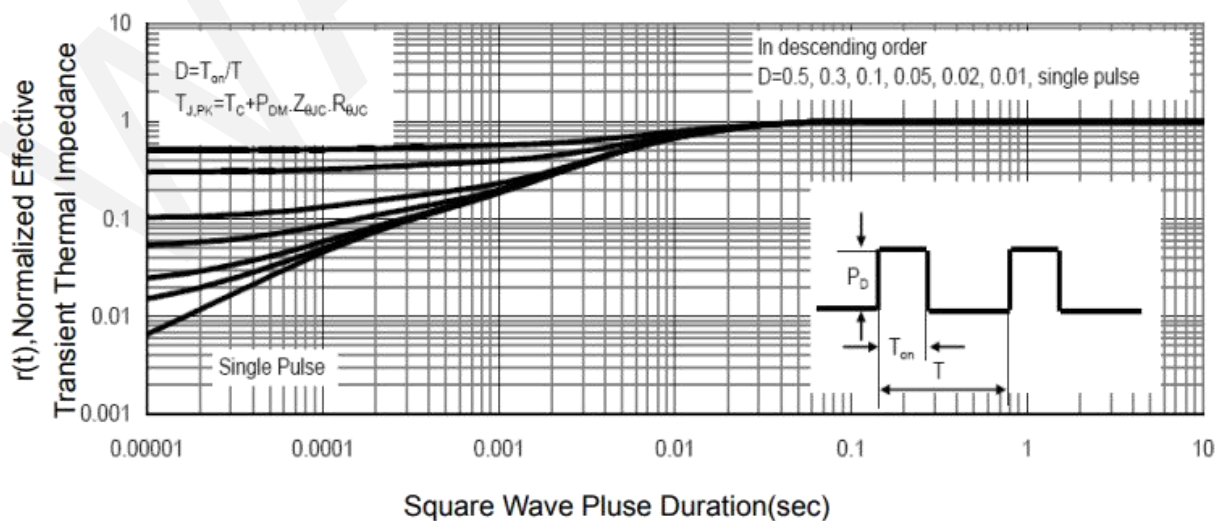
**Safe Operation Area**



**$BV_{DSS}$  vs Junction Temperature**

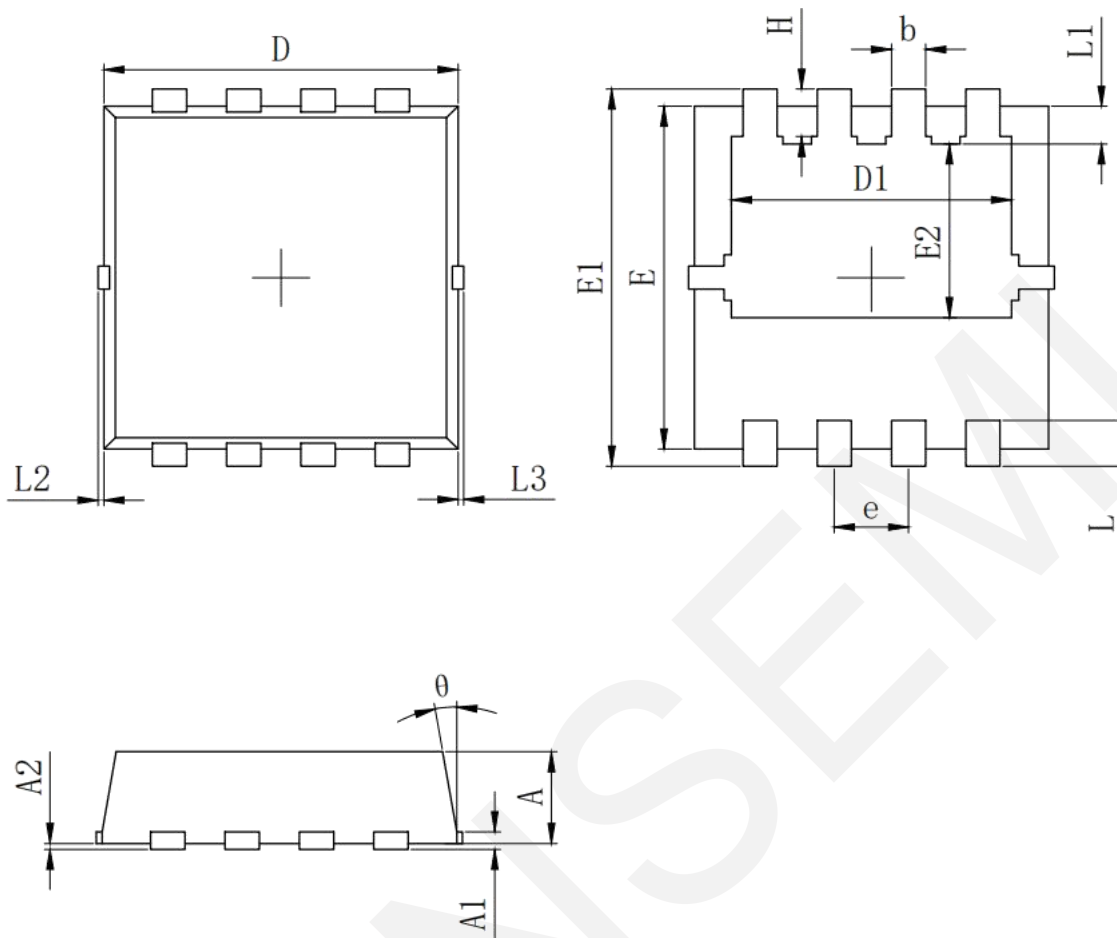


**$V_{GS(th)}$  vs Junction Temperature**



**Normalized Maximum Transient Thermal Impedance**

## 8.Package Dimensions



SYMBOL	MILLIMETER		
	MIN	Typ.	MAX
A	0.700	0.800	0.900
A1	0.152 REF.		
A2	0~0.05		
D	3.000	3.100	3.200
D1	2.300	2.450	2.600
E	2.900	3.000	3.100
E1	3.150	3.300	3.450
E2	1.320	1.520	1.720
b	0.200	0.300	0.400
e	0.550	0.650	0.750
L	0.300	0.400	0.500
L1	0.180	0.330	0.480
L2	0~0.100		
L3	0~0.100		
H	0.315	0.415	0.515
θ	8°	10°	12°

## **9. Important Notice**

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