



WANSEMI
万芯半导体

WP4060K

Enhancement Mode N-Channel Power MOSFET

TO-252/NMOS/40V/ ± 20 V/1.9V/60A/5.5m Ω

Rev0.7

40V, 5.5mΩ, 60A, Single N-Channel

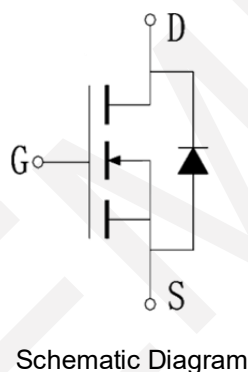
1.Features

- ◆ 40V MOSFET technology
- ◆ Low on-state resistance
- ◆ Fast switching
- ◆ $V_{GS} \pm 20V$

V_{DS}	$R_{DS(on)}$ Typ.	I_D Max.
40V	5.5mΩ @ 10V	60A
	7.5mΩ @ 4.5V	

2.Applications

- ◆ Power Switching Application
- ◆ Load Switching



3.Package Marking and Ordering Information

Part no.	Marking	Package	PCS/Reel	PCS/CTN.
WP4060K	WP4060K	TO-252	2,500	25,000

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

Parameter	Symbol	Maximum	Units
Drain to Source Voltage	V_{DSS}	40	V
Gate to Source Voltage	V_{GSS}	± 20	V
Drain Current (DC)	I_D	60	A
Drain Current (Pulse), $PW \leq 300\mu s$	I_{DP}	320	A
Total Dissipation	P_D	80	W
Avalanche Energy, Single Pulsed	E_{AS}	196	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
Thermal Resistance, Junction to Case	$R_{\theta JC}$	2.8	$^{\circ}\text{C/W}$

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.

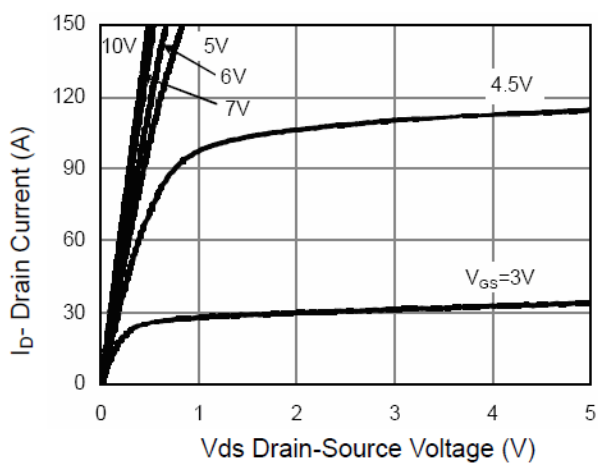
6. Electrical Characteristics at $T_a=25^{\circ}\text{C}$ (Note 3)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$	40			V
Zero-Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 20\text{V}$, $V_{GS} = 0\text{V}$			1	μA
Gate to Source Leakage Current	I_{GSS}	$V_{GS} = \pm 12\text{V}$, $V_{DS} = 0\text{V}$			± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_{DS}=250\mu\text{A}$	1	1.9	2.5	V
Static Drain to Source On-State Resistance	$R_{DS(on)}$	$I_D = 20\text{A}$, $V_{GS} = 10\text{V}$	-	5.5	7	$\text{m}\Omega$
		$I_D = 10\text{A}$, $V_{GS} = 4.5\text{V}$	-	7.5	13	$\text{m}\Omega$
Forward Transconductance	G_{FS}	$I_D = 20\text{A}$, $V_{DS} = 10\text{V}$	15			S
Input Capacitance	C_{iss}	$V_{GS}=0\text{V}$, $V_{DS}=20\text{V}$, Frequency=1.0MHz		2662		pF
Output Capacitance	C_{oss}			322		pF
Reverse Transfer Capacitance	C_{rss}			246		pF
Turn-ON Delay Time	$t_{d(on)}$	$V_{DD} = 20\text{V}$, $R_L = 1\Omega$ $V_{GS} = 10\text{V}$, $R_G = 3\Omega$		12		ns
Rise Time	t_r			11		ns
Turn-OFF Delay Time	$t_{d(off)}$			39		ns
Fall Time	t_f			12		ns
Total Gate Charge	Q_g	$V_{DS} = 20\text{V}$, $V_{GS} = 10\text{V}$, $I_D = 20\text{A}$		54.3		nC
	Q_{gs}			6.9		nC
	Q_{gd}			14.5		nC
Diode Forward Voltage	V_{FSD}	$I_S = 10\text{A}$, $V_{GS} = 0$		0.85	1.2	V

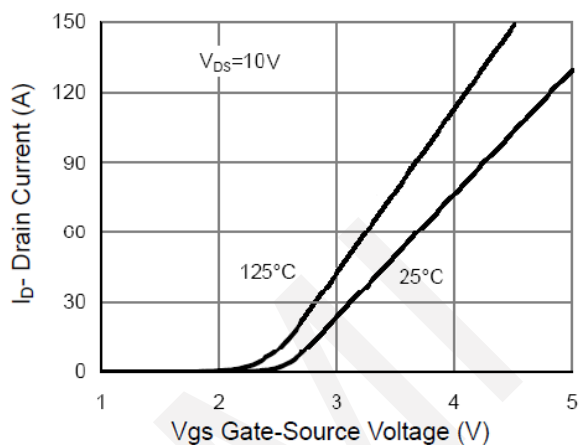
Note 3: Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.



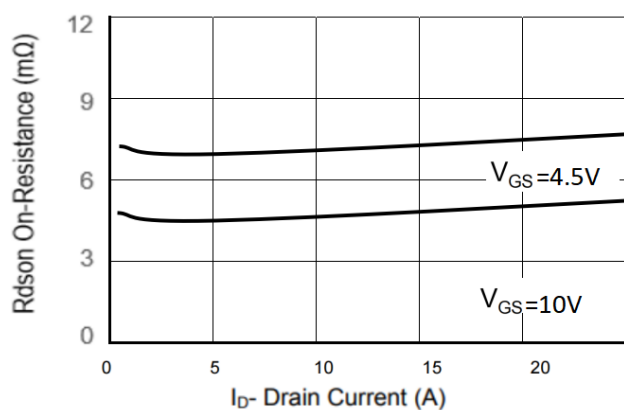
7. Typical electrical and thermal characteristics



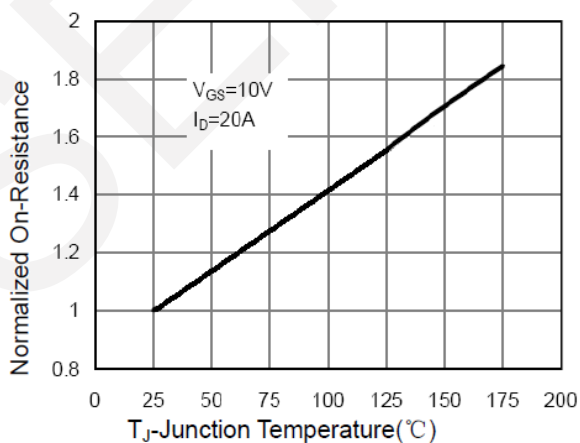
Output Characteristics



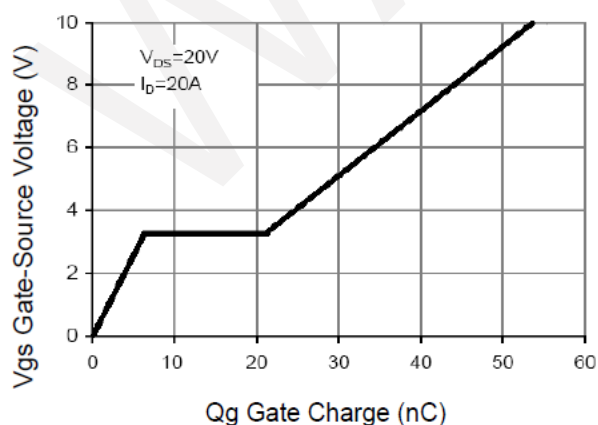
Transfer Characteristics



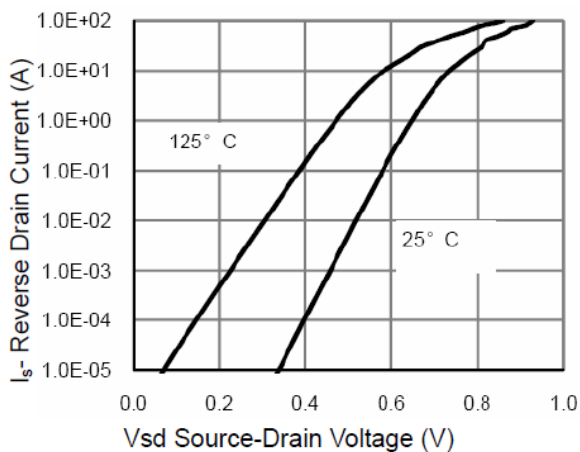
$R_{DS(on)}$ -Drain Current



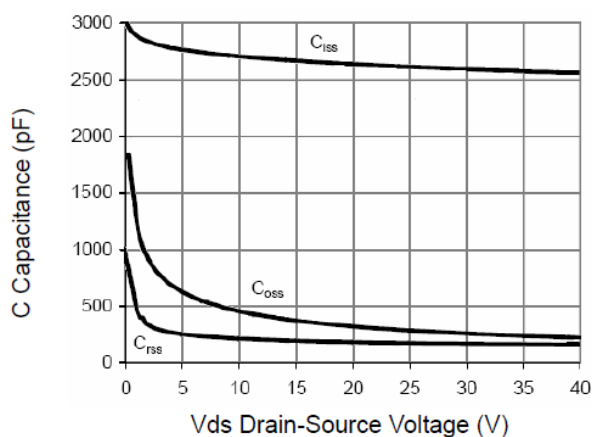
$R_{DS(on)}$ -Junction Temperature



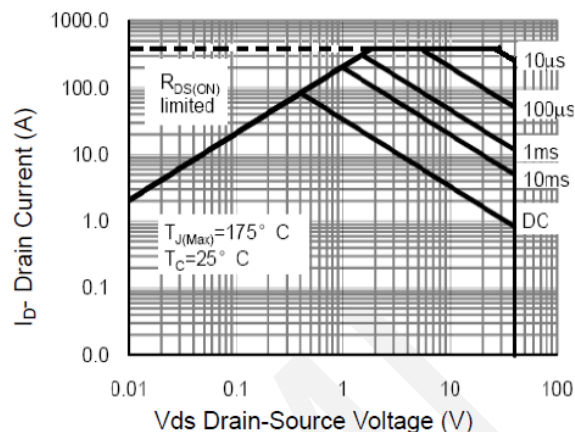
Gate Charge



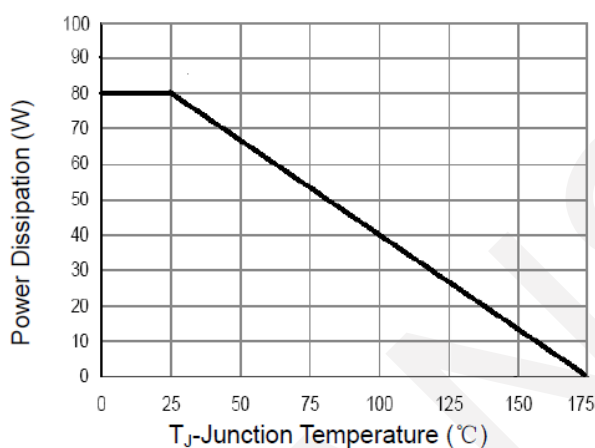
Source-Drain Diode Forward



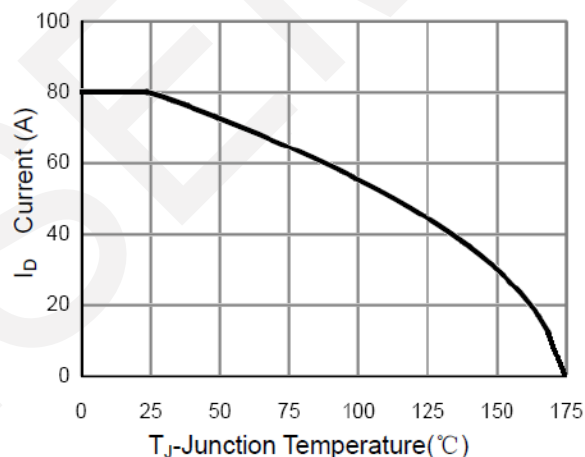
Capacitance vs Vds



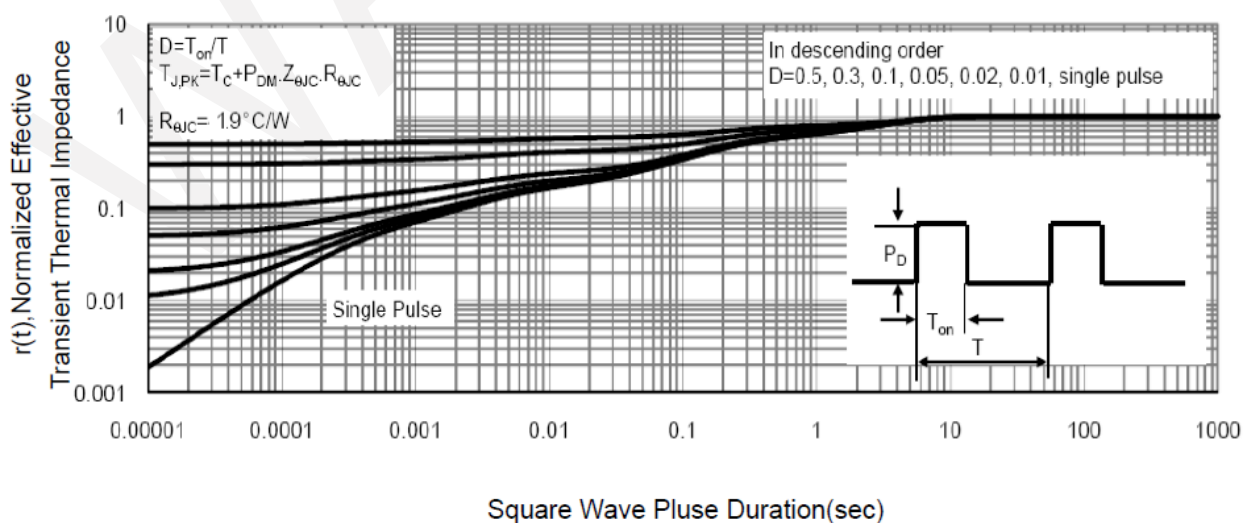
Safe Operation Area



Power De-rating

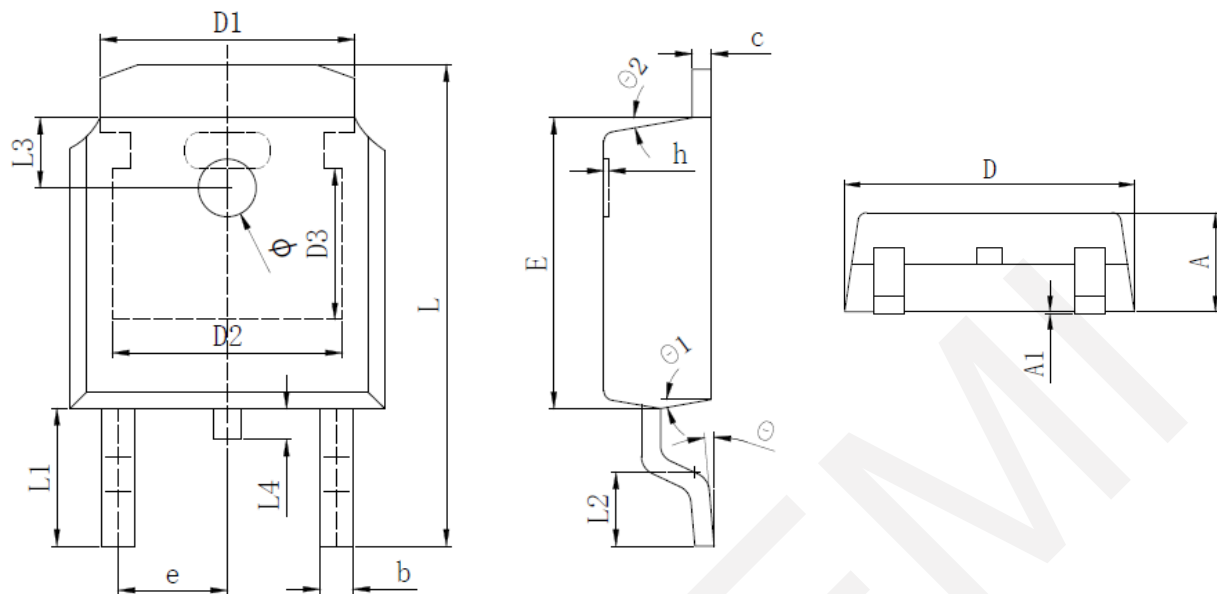


ID Current vs. Junction Temperature



Normalized Maximum Transient Thermal Impedance

8.Package Dimensions



SYMBOL	MILLIMETER		
	MIN	Typ.	MAX
A	2.200	2.300	2.400
A1	0.000		0.127
b	0.640	0.690	0.740
c(电镀后)	0.460	0.520	0.580
D	6.500	6.600	6.700
D1	5.334 REF		
D2	4.826 REF		
D3	3.166 REF		
E	6.000	6.100	6.200
e	2.286 TYP		
h	0.000	0.100	0.200
L	9.900	10.100	10.300
L1	2.888 REF		
L2	1.400	1.550	1.700
L3	1.600 REF		
L4	0.600	0.800	1.000
Φ	1.100	1.200	1.300
θ	0°		8°
θ 1	9° TYP		
θ 2	9° TYP		

9. Important Notice

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