



**WANSEMI**  
万芯半导体

**WP2050KA**

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

TO-252/NMOS/20V/ $\pm 12$ V/0.75V/50A/6.0m $\Omega$

Re0.7

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## 20V, 6.0mΩ, 50A, Single N-Channel

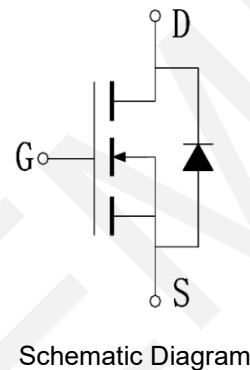
### 1.Features

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

$V_{DS}$	$R_{DS(on)}$ Typ.	$I_D$ Max.
20V	6.0mΩ @ 4.5V	50A
	10mΩ @ 2.5V	

### 2.Applications

- ◆ Power Switching Application
- ◆ Load Switching



### 3.Package Marking and Ordering Information

Part no.	Marking	Package	PCS/Reel	PCS/CTN.
WP2050KA	WP2050KA	TO-252	2,500	25,000

### 4Absolute 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)	$I_D$	50	A
Drain Current (Pulse), $PW \leq 300\mu s$	$I_{DP}$	200	A
Total Dissipation	$P_D$	30	W
Avalanche Energy, Single Pulsed	$E_{AS}$	81	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 (Note 2)**

Parameter	Symbol	Value	Unit
Junction to Ambient	$R_{\theta JA}$	32	$^{\circ}\text{C/W}$
Junction to case	$R_{\theta JC}$	3.4	$^{\circ}\text{C/W}$

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.

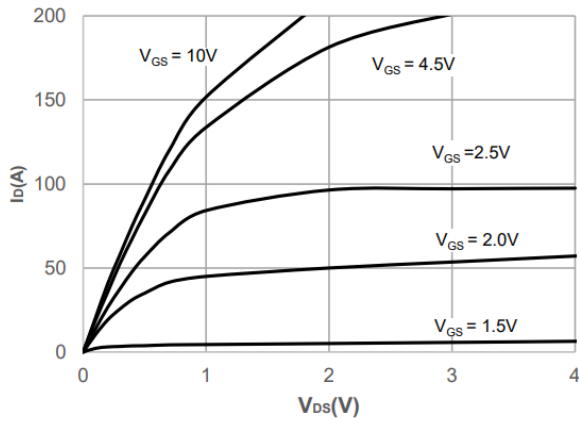
**6. Electrical Characteristics at  $T_a=25^{\circ}\text{C}$  (Note 3)**

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	$I_{DSS}$	$V_{DS} = 20\text{V}, V_{GS} = 0\text{V}$	-	-	1	$\mu\text{A}$
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	1.3	V
Static Drain to Source On-State Resistance	$R_{DS(on)}$	$I_D = 25\text{A}, V_{GS} = 4.5\text{V}$	-	6.0	7.8	$\text{m}\Omega$
		$I_D = 10\text{A}, V_{GS} = 2.5\text{V}$	-	10	15.0	$\text{m}\Omega$
Input Capacitance	$C_{iss}$	$V_{GS}=0\text{V},$ $V_{DS}=10\text{V},$ Frequency=1.0MHz	-	1651	-	pF
Output Capacitance	$C_{oss}$		-	278	-	pF
Reverse Transfer Capacitance	$C_{rss}$		-	252	-	pF
Turn-ON Delay Time	$t_{d(on)}$	$V_{DD} = 10\text{V}, I_D = 20\text{A},$ $V_{GS} = 4.5\text{V},$ $R_G = 3\Omega,$	-	12	-	ns
Rise Time	$t_r$		-	33	-	ns
Turn-OFF Delay Time	$t_{d(off)}$		-	48	-	ns
Fall Time	$t_f$		-	95	-	ns
Total Gate Charge	$Q_g$	$V_{DS} = 10\text{V},$ $V_{GS} = 4.5\text{V},$ $I_D = 20\text{A}$	-	23	-	nC
	$Q_{gs}$		-	4	-	nC
	$Q_{gd}$		-	7	-	nC
Diode Forward Voltage	$V_{FSD}$	$I_S = 25\text{A}, V_{GS} = 0\text{V}$	0.4	0.85	1.2	V

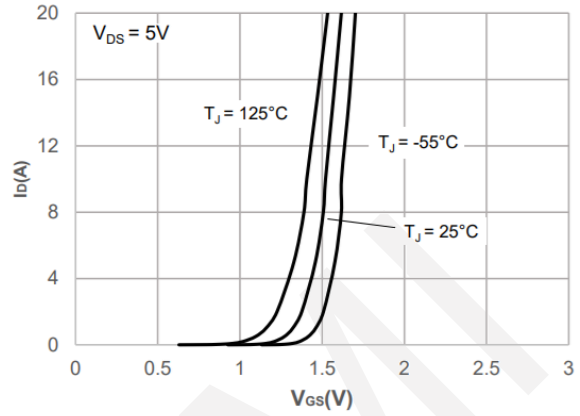
Note 3: Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.



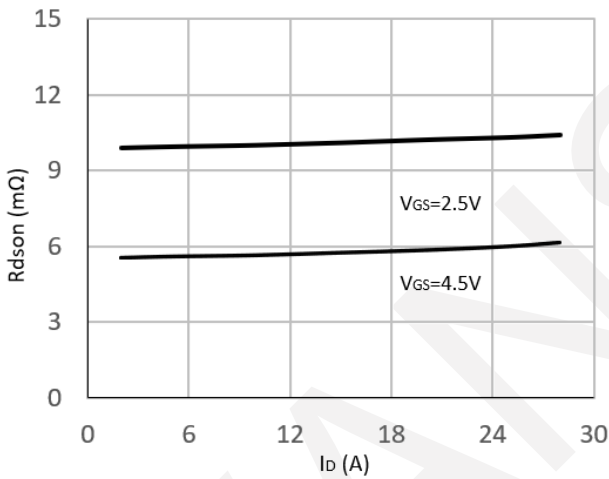
### 7. Typical electrical and thermal characteristics



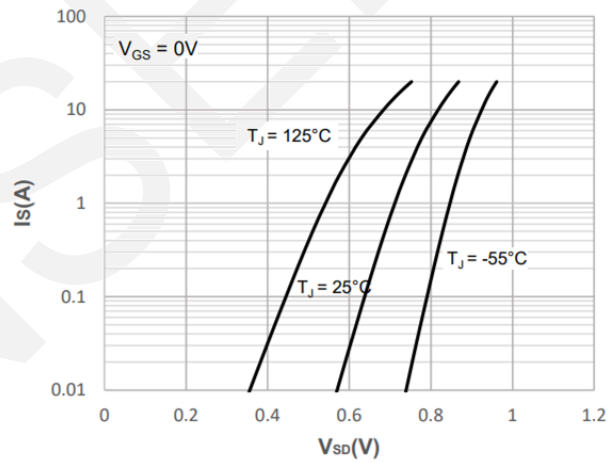
Output Characteristics



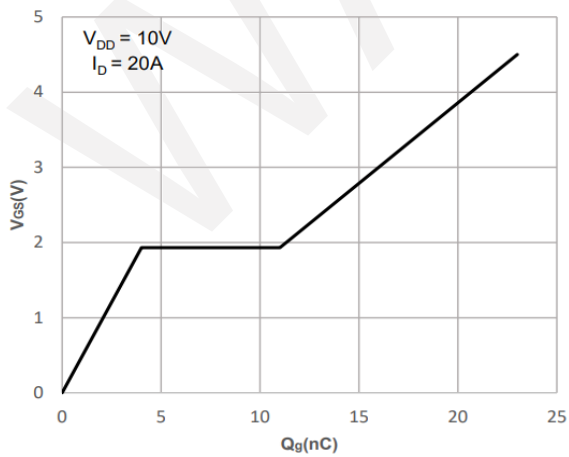
Typical Transfer Characteristics



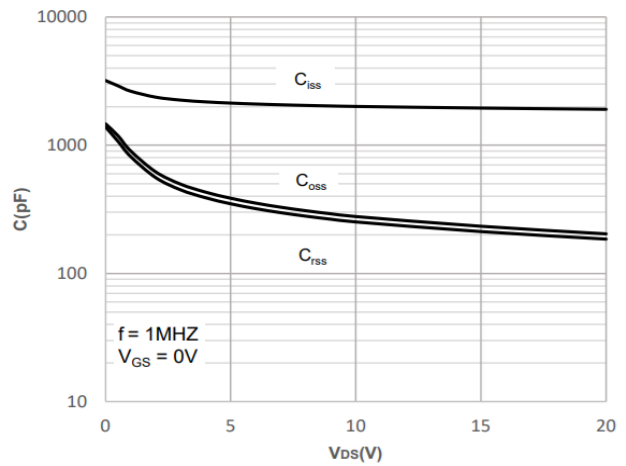
On-resistance vs. Drain Current



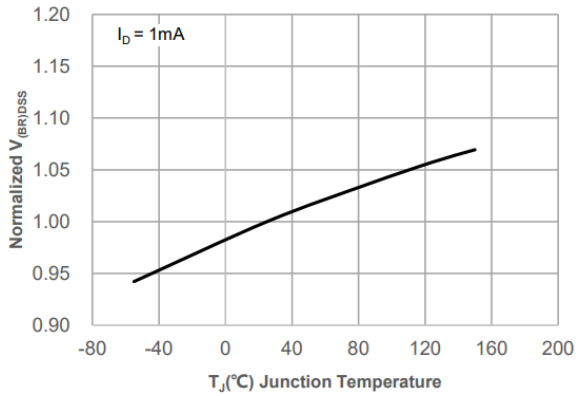
Body Diode Characteristics



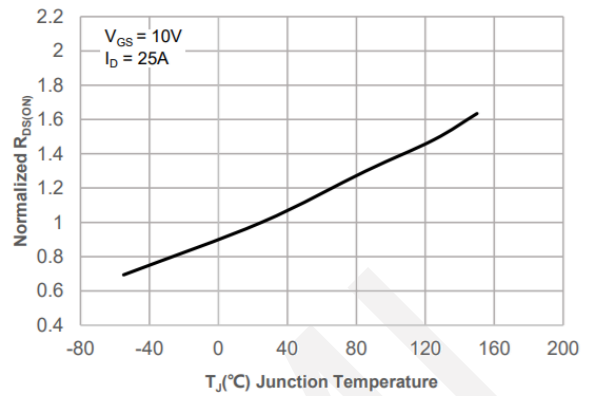
Gate Charge Characteristics



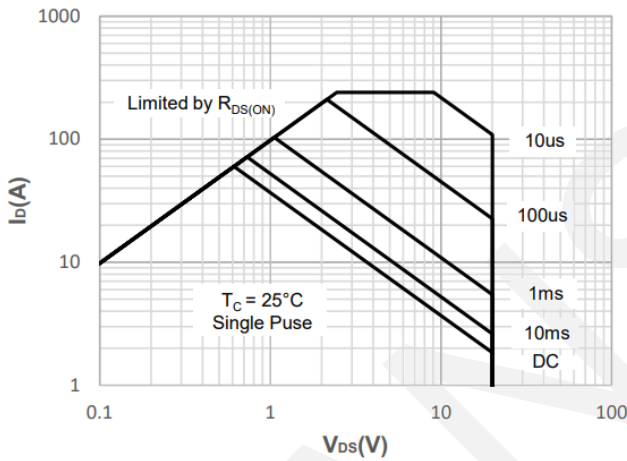
Capacitance Characteristics



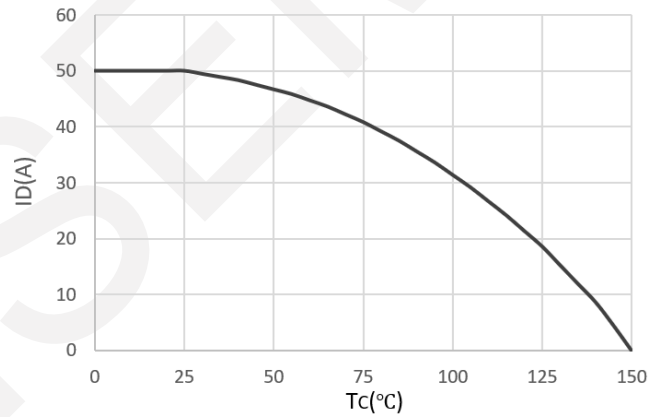
Normalized Breakdown Voltage vs.  
Junction Temperature



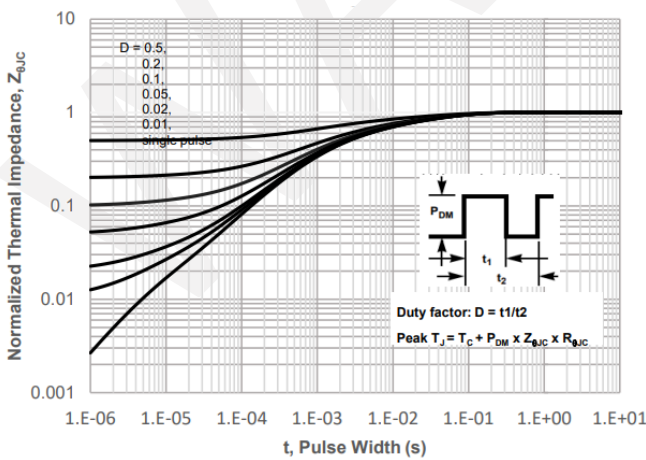
Normalized on Resistance vs.  
Junction Temperature



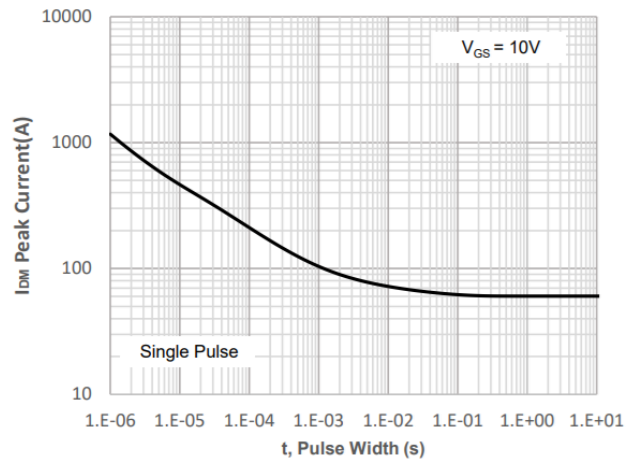
Maximum Safe Operating Area



Maximum Continuous Drain Current vs.  
Case Temperature



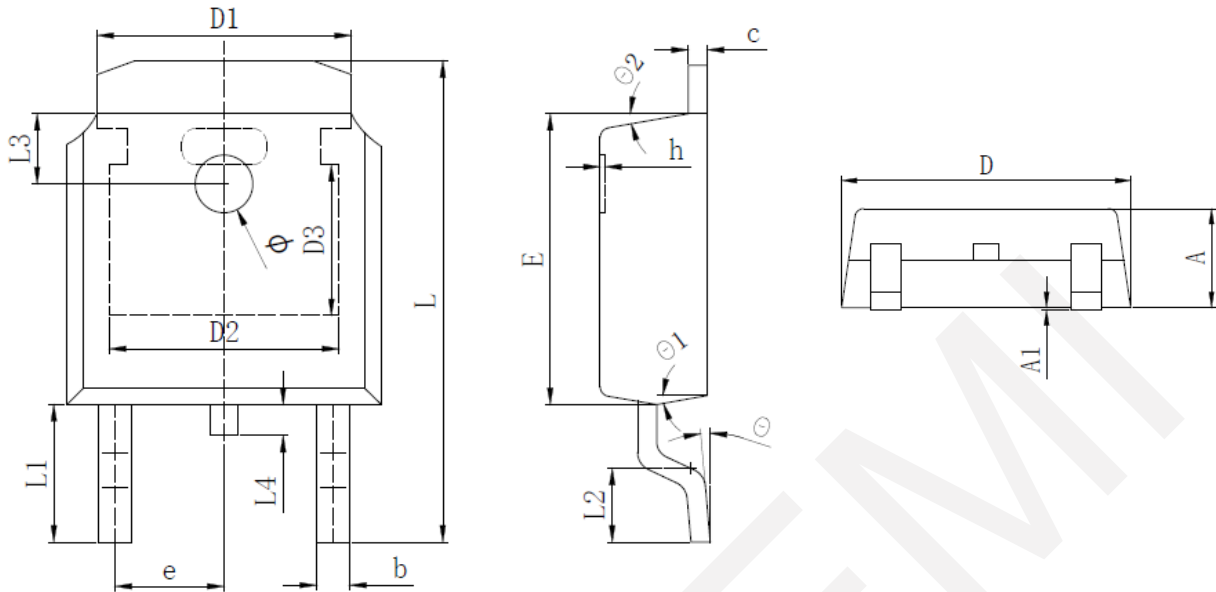
Normalized Maximum Transient  
Thermal Impedance



Peak Current Capacity



**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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