

### Features

- 150V/90A,  
 $R_{DS(on)} = 7.5m\Omega(Typ.)@V_{GS}=10V$
- Excellent  $Q_G \times R_{DS(on)}$  product(FOM)
- SGT Technology
- 100% avalanche tested

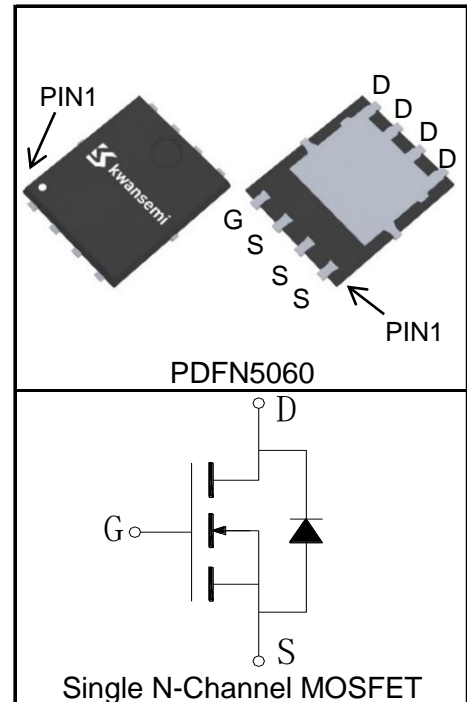
### Applications

- USB-PD Adaptors
- Synchronous Rectification



Halogen-Free

### Pin Description



### Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
<b>Common Ratings</b> ( $T_C=25^\circ C$ Unless Otherwise Noted)			
$V_{DSS}$	Drain-Source Voltage	150	V
$V_{GSS}$	Gate-Source Voltage	$\pm 20$	V
$T_{Jmax}$	Maximum Junction Temperature	150	$^\circ C$
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to 150	$^\circ C$
$I_S$	Diode Continuous Forward Current	$T_C=25^\circ C$ 90	A
<b>Mounted on Large Heat Sink</b>			
$I_{DP}^{①}$	Pulse Drain Current	$T_C=25^\circ C$ 360	A
$I_D^{②}$	Continuous Drain Current@ $T_C(V_{GS}=10V)$	$T_C=25^\circ C$ 90	A
		$T_C=100^\circ C$ 57	
	Continuous Drain Current@ $T_A(V_{GS}=10V)^{③}$	$T_A=25^\circ C$ 15	
		$T_A=70^\circ C$ 12	
$P_D$	Maximum Power Dissipation@ $T_C$	$T_C=25^\circ C$ 142	W
		$T_C=100^\circ C$ 56	
	Maximum Power Dissipation@ $T_A^{③}$	$T_A=25^\circ C$ 4.2	
		$T_A=70^\circ C$ 2.7	

Symbol	Parameter	Rating	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	0.88	°C/W
$R_{\theta JA}$ ③	Thermal Resistance-Junction to Ambient	30	°C/W
<b>Drain-Source Avalanche Ratings</b>			
$E_{AS}$ ④	Avalanche Energy, Single Pulsed	552	mJ

**Electrical Characteristics** ( $T_C=25^\circ\text{C}$  Unless Otherwise Noted)

Symbol	Parameter	Test Condition	KSB2021NAT			Unit
			Min.	Typ.	Max.	
<b>Static Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	150			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=150V, V_{GS}=0V$			1	$\mu A$
		$T_J=125^\circ C$			30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	2	3	4	V
$I_{GSS}$	Gate Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$			$\pm 100$	nA
$R_{DS(ON)}$ ⑤	Drain-Source On-state Resistance	$V_{GS}=10V, I_{DS}=20A$		7.5	9	m $\Omega$
		$V_{GS}=6V, I_{DS}=10A$		8.5	11	
<b>Diode Characteristics</b>						
$V_{SD}$ ⑤	Diode Forward Voltage	$I_{SD}=20A, V_{GS}=0V$		0.8	1.2	V
$t_{rr}$	Reverse Recovery Time	$I_{SD}=20A, dI_{SD}/dt=100A/\mu s$		53		ns
$Q_{rr}$	Reverse Recovery Charge			64		nC
<b>Dynamic Characteristics</b> ⑥						
$R_G$	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1MHz$		1		$\Omega$
$C_{iss}$	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=75V,$ Frequency=200KHz		4605		pF
$C_{oss}$	Output Capacitance			315		
$C_{riss}$	Reverse Transfer Capacitance			9		
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=75V, I_{DS}=20A,$ $V_{GS}=10V, R_G=3\Omega$		14		ns
$t_r$	Turn-on Rise Time			10		
$t_{d(OFF)}$	Turn-off Delay Time			17		
$t_f$	Turn-off Fall Time			11		
<b>Gate Charge Characteristics</b> ⑥						
$Q_g$	Total Gate Charge	$V_{DS}=75V, V_{GS}=10V,$ $I_{DS}=20A$		58		nC
$Q_{gs}$	Gate-Source Charge			20		
$Q_{gd}$	Gate-Drain Charge			8.4		

**Notes:**

- ①Pulse width limited by safe operating area.
- ②Calculated continuous current based on maximum allowable junction temperature. The package limitation current is 50A.
- ③When mounted on 1 inch square copper board,  $t \leq 10\text{sec}$ .
- ④Limited by  $T_{Jmax}$ , Starting  $T_J = 25^\circ\text{C}$ ,  $I_{ASmax} = 47\text{A}$ ,  $L = 0.5\text{mH}$ ,  $V_{DD} = 48\text{V}$ ,  $R_G = 25\Omega$ ,  $V_{GS} = 10\text{V}$ . Part not recommended for use above this value. 100% Final Test at  $I_{AS} = 24\text{A}$ ,  $L = 0.5\text{mH}$ .
- ⑤Pulse test; Pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- ⑥Guaranteed by design, not subject to production testing.

**Ordering and Marking Information**

Device	Package	Packaging	Quantity	Reel Size	Tape width
KSB2021NAT	PDFN5060	Tape&Reel	5000	13"	12mm

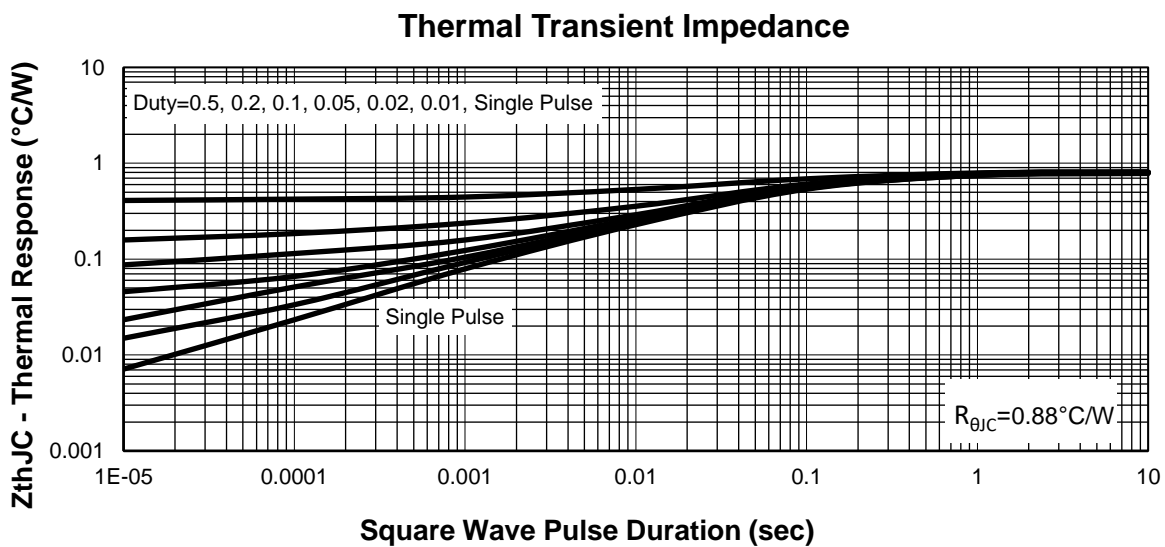
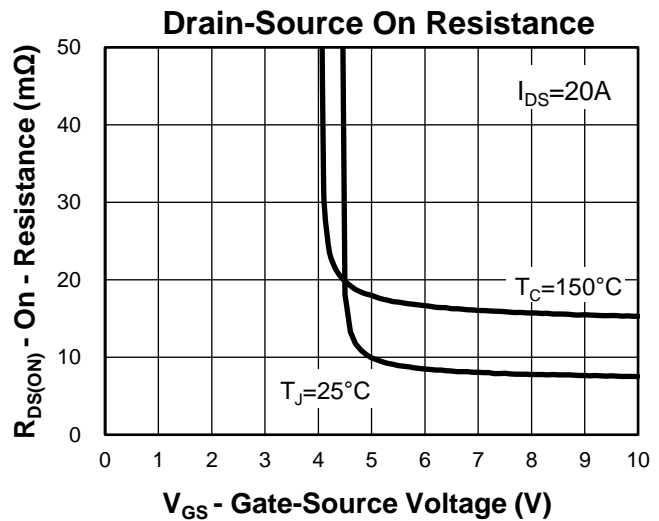
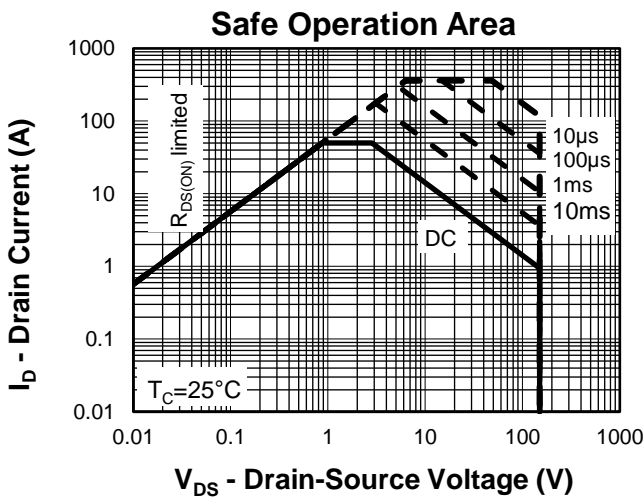
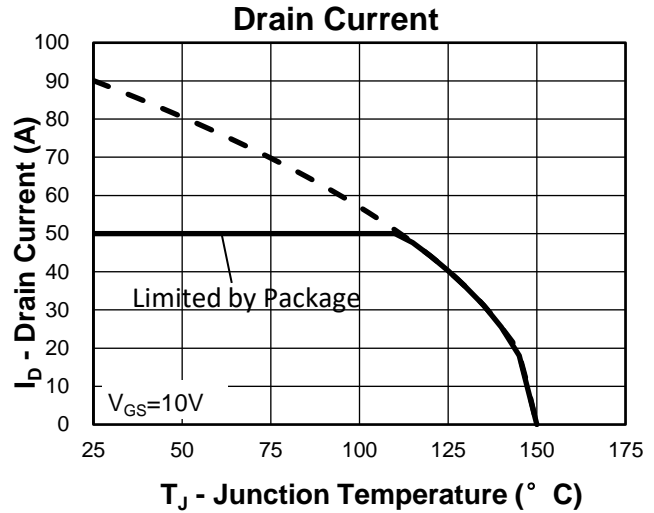
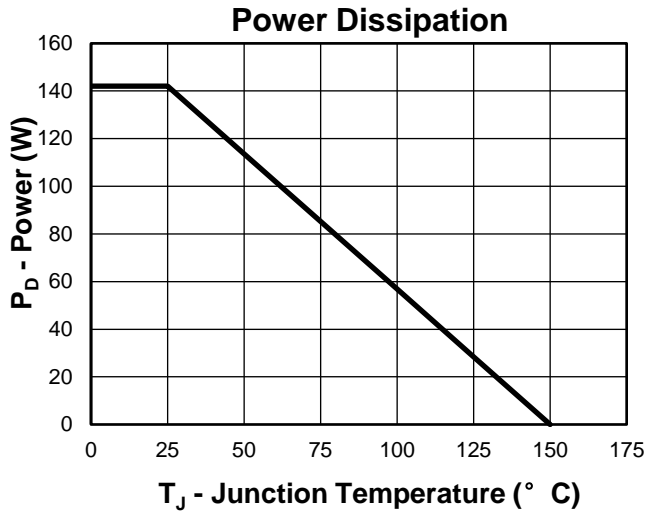


1st Line: Kwansemi LOGO, Kwansemi Code(KS)

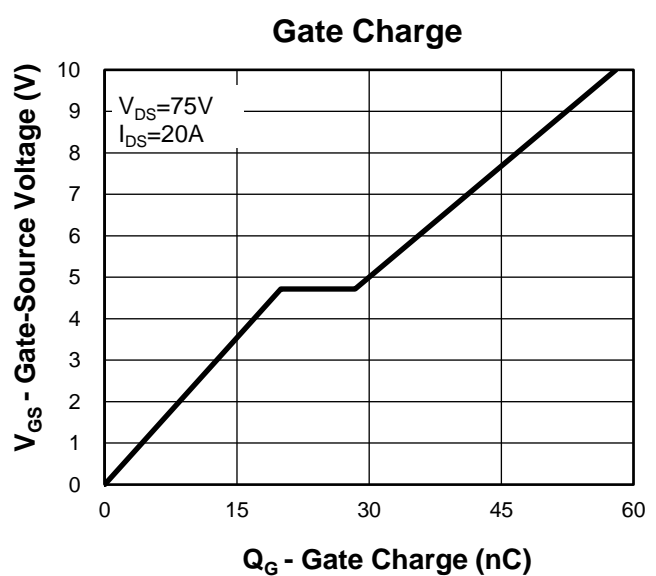
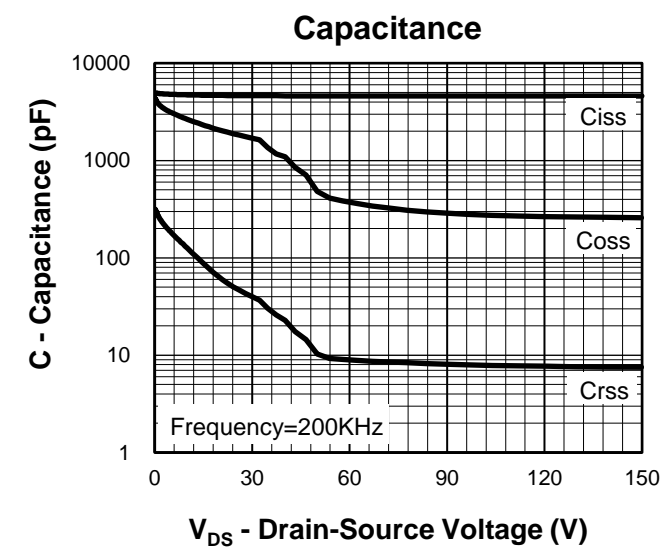
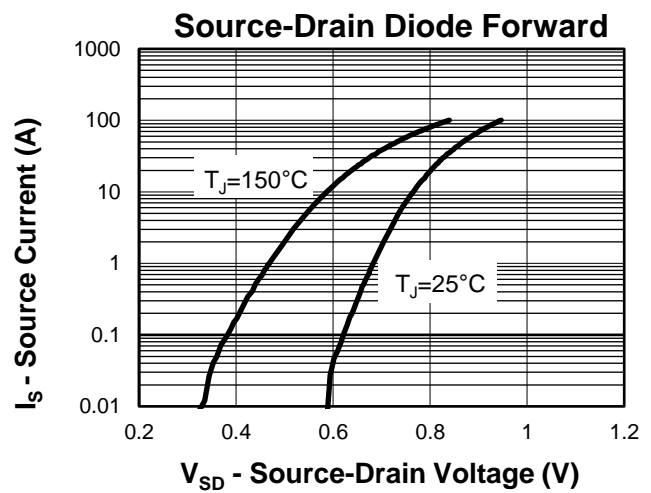
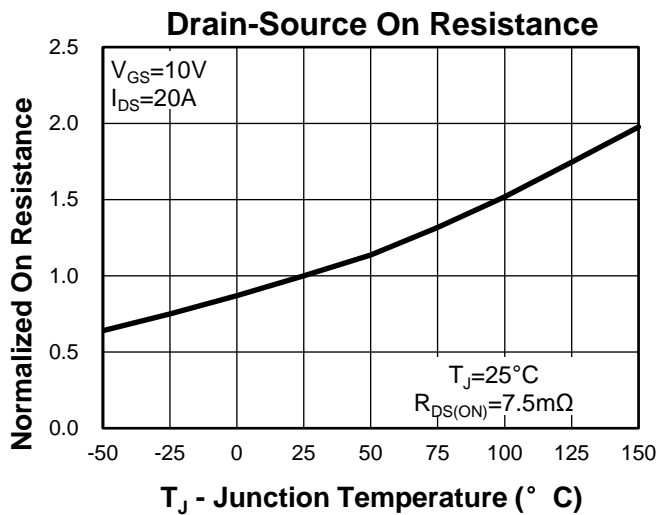
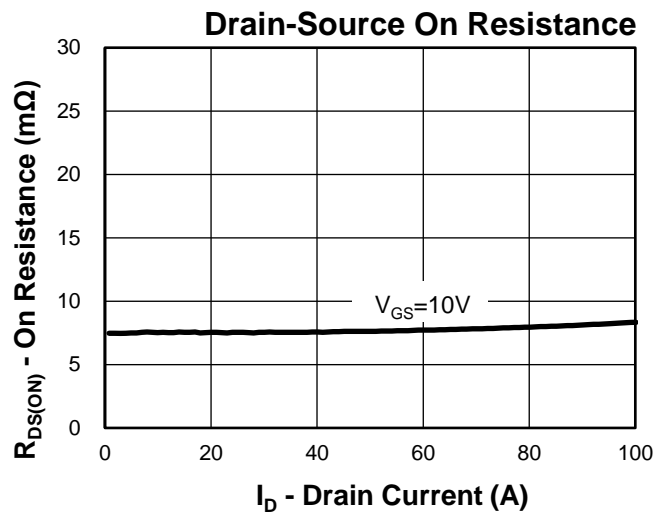
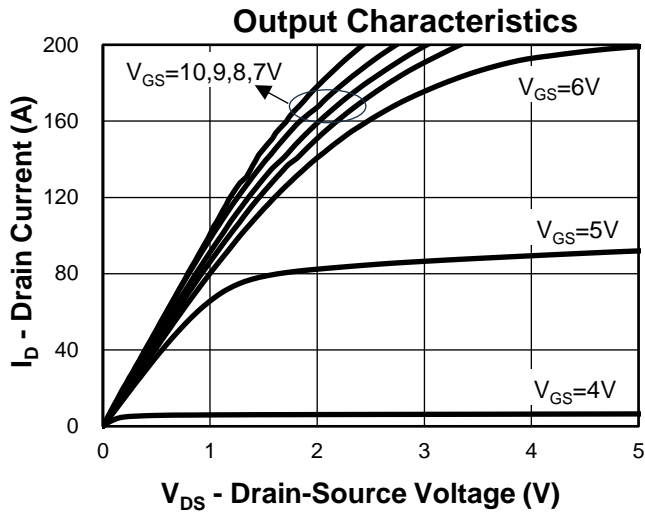
2nd Line: Part Number(B2021T)

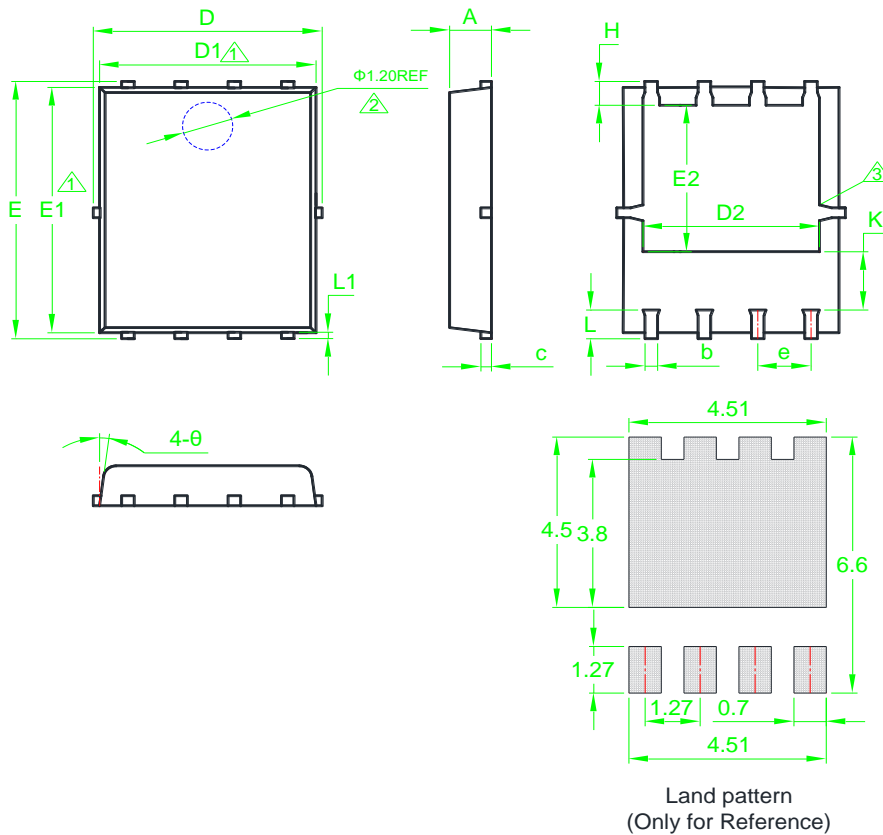
3rd Line: Lot Number(YWWXXX)

### Typical Characteristics



### Typical Characteristics



**Package Information**
**PDFN5060**


SYMBOL	MM			INCH			SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX		MIN	NOM	MAX	MIN	NOM	MAX
A	0.90	1.00	1.20	0.035	0.039	0.047	E2	3.27	3.50	3.90	0.129	0.138	0.154
b	0.25	*	0.50	0.010	*	0.020	e	1.27BSC			0.050BSC		
c	0.20	0.25	0.30	0.008	0.010	0.012	H	0.41	0.51	0.71	0.016	0.020	0.028
D	5.15BSC			0.203BSC			K	1.10	1.35	1.50	0.043	0.053	0.059
D1	4.80	5.00	5.40	0.189	0.197	0.213	L	0.51	0.61	0.71	0.020	0.024	0.028
D2	3.60	*	4.40	0.142	*	0.173	L1	0.06	0.13	0.30	0.002	0.005	0.012
E	5.90	6.15	6.30	0.232	0.242	0.248	θ	0°	*	12°	0°	*	12°
E1	5.40	5.80	5.95	0.213	0.228	0.234							

- ① Dimensions D1 and E1 do not include mold flash protrusions or gate burrs.
- ② The existence and size of demolding hole are variable depending on mold.
- ③ The size and shape of exposed pad are variable depending on mold.

### Avalanche Test Circuit and Waveforms



### Switching Time Test Circuit and Waveforms



### Diode Recovery Test Circuit and Waveforms



### Gate Charge Test Circuit and Waveform



### Customer Service

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