

### Features

- -60V/-70A,  
 $R_{DS(ON)} = 7.5m\Omega(Typ.)@V_{GS}=-10V$   
 $R_{DS(ON)} = 9.5m\Omega(Typ.)@V_{GS}=-4.5V$
- Excellent  $Q_G \times R_{DS(on)}$  product(FOM)
- SGT Technology
- Fast Switching Speed
- 100% avalanche tested

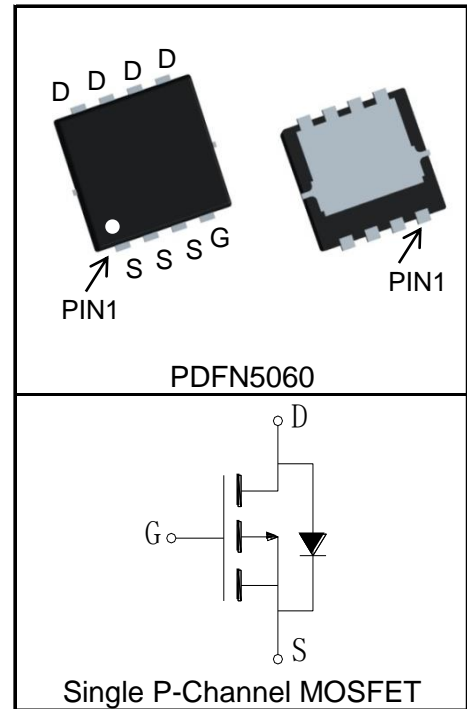
### Applications

- Switching Application Systems



Halogen-Free

### Pin Description



### Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit	
<b>Common Ratings</b> ( $T_C=25^\circ\text{C}$ Unless Otherwise Noted)				
$V_{DSS}$	Drain-Source Voltage	-60	V	
$V_{GSS}$	Gate-Source Voltage	$\pm 20$		
$T_J$	Maximum Junction Temperature	150	$^\circ\text{C}$	
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$	
$I_S$	Diode Continuous Forward Current	$T_C=25^\circ\text{C}$	-70	A
<b>Mounted on Large Heat Sink</b>				
$I_{DP}^{①}$	300 $\mu\text{s}$ Pulse Drain Current Tested	$T_C=25^\circ\text{C}$	-280	A
$I_D^{②}$	Continuous Drain Current@ $T_C(V_{GS}=-10V)$	$T_C=25^\circ\text{C}$	-70	A
		$T_C=100^\circ\text{C}$	-44	
	Continuous Drain Current@ $T_A(V_{GS}=-10V)^{③}$	$T_A=25^\circ\text{C}$	-16	
		$T_A=70^\circ\text{C}$	-13	
$P_D$	Maximum Power Dissipation@ $T_C$	$T_C=25^\circ\text{C}$	74	W
		$T_C=100^\circ\text{C}$	29	
	Maximum Power Dissipation@ $T_A^{③}$	$T_A=25^\circ\text{C}$	4.2	
		$T_A=70^\circ\text{C}$	2.7	

Symbol	Parameter	Rating	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	1.7	°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	121	mJ

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

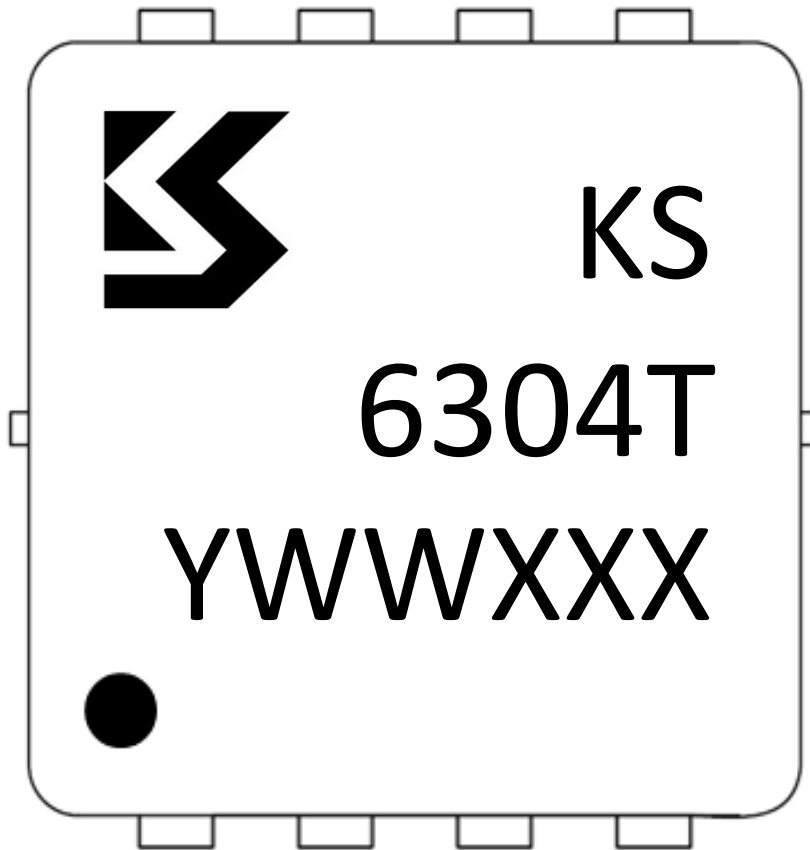
Symbol	Parameter	Test Condition	KS6304NAT			Unit
			Min.	Typ.	Max.	
<b>Static Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=-250\mu A$	-60			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=-60V, V_{GS}=0V$			-1	$\mu A$
		$T_J=125^\circ\text{C}$			-30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=-250\mu A$	-1.1	-1.8	-2.3	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	9.5	$m\Omega$
		$V_{GS}=-4.5V, I_{DS}=-16A$		9.5	13	$m\Omega$
<b>Diode Characteristics</b>						
$V_{SD}$ ⑤	Diode Forward Voltage	$I_{SD}=-20A, V_{GS}=0V$		-0.85	-1.2	V
$t_{rr}$	Reverse Recovery Time	$I_{SD}=-20A, di_{SD}/dt=100A/\mu s$		35		ns
$Q_{rr}$	Reverse Recovery Charge			78		nC
<b>Dynamic Characteristics</b> ⑥						
$R_G$	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$		4.8		$\Omega$
$C_{iss}$	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=-30V,$ Frequency=1.0MHz		4100		$\mu F$
$C_{oss}$	Output Capacitance			835		
$C_{riss}$	Reverse Transfer Capacitance			60		
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=-30V, I_{DS}=-20A,$ $V_{GS}=-10V, R_G=3\Omega$		19		ns
$t_r$	Turn-on Rise Time			33		
$t_{d(OFF)}$	Turn-off Delay Time			52		
$t_f$	Turn-off Fall Time			21		
<b>Gate Charge Characteristics</b> ⑥						
$Q_g$	Total Gate Charge	$V_{DS}=-30V, V_{GS}=-10V,$ $I_{DS}=-20A$		48		nC
$Q_{gs}$	Gate-Source Charge			10		
$Q_{gd}$	Gate-Drain Charge			13		

**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  $T_{Jmax}$ ,  $I_{AS} = -22\text{A}$ ,  $L = 0.5\text{mH}$ ,  $V_{DD} = -30\text{V}$ ,  $R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$ .
- 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
KS6304NAT	PDFN5060	Tape&Reel	5000	13"	12mm

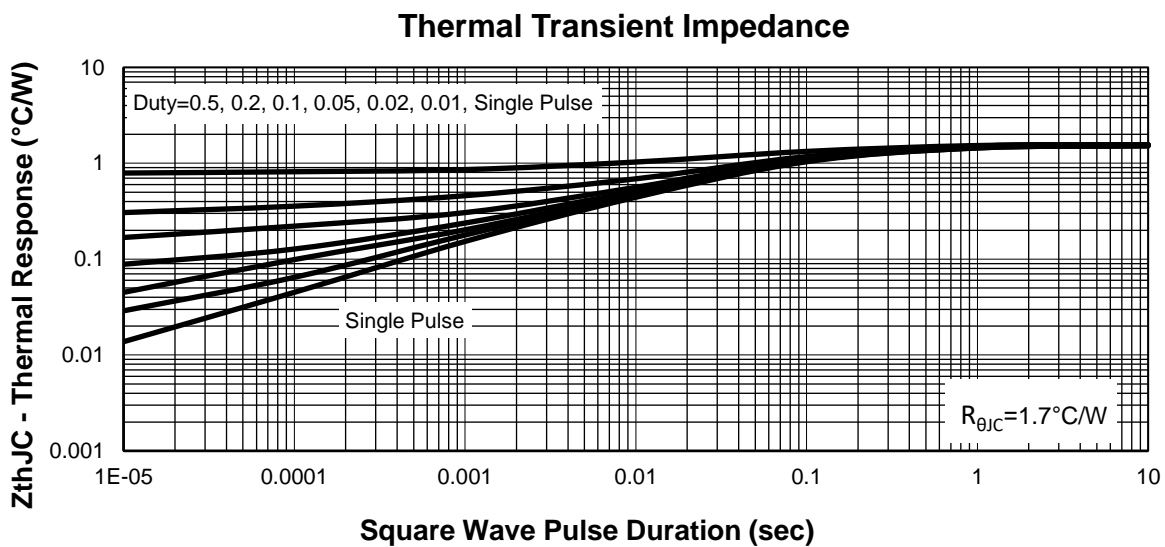
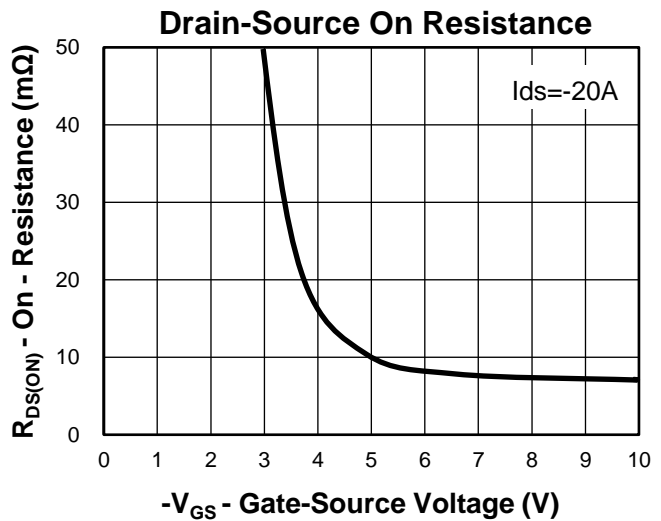
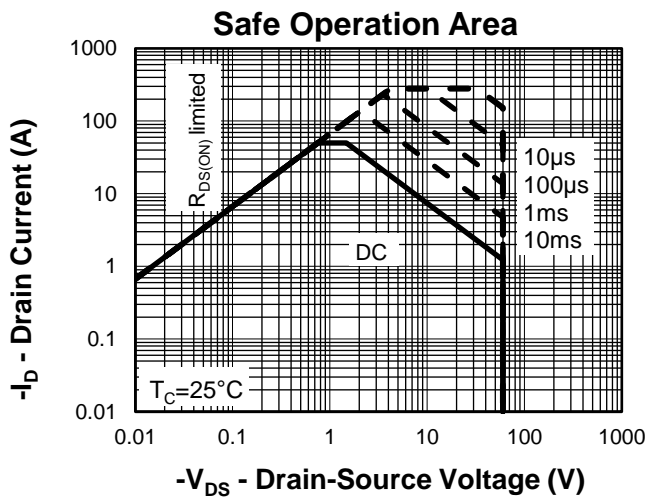
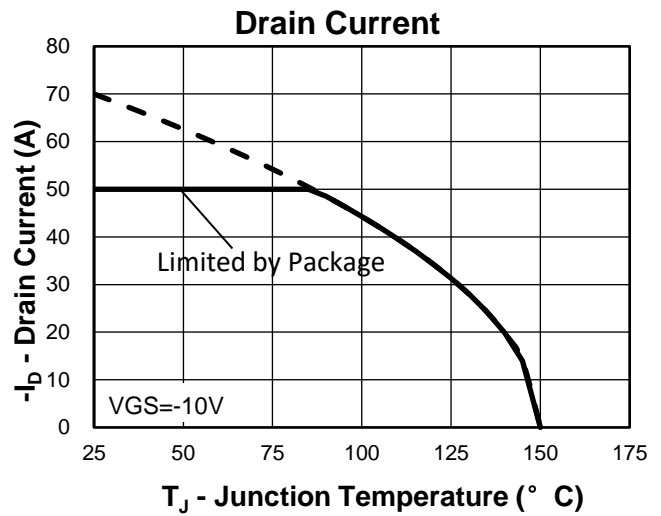
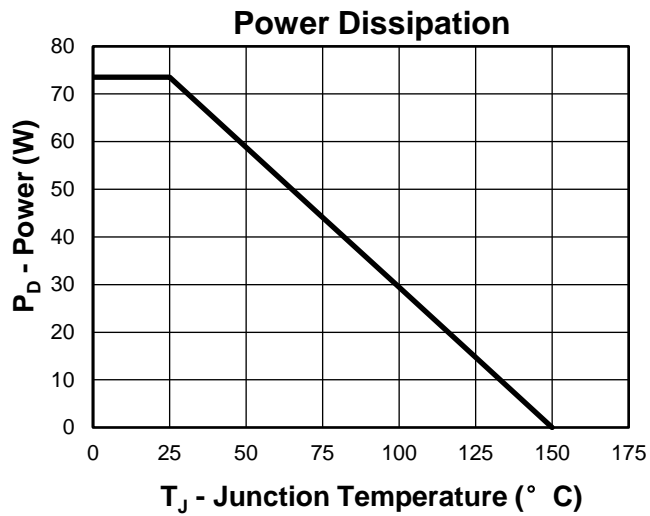


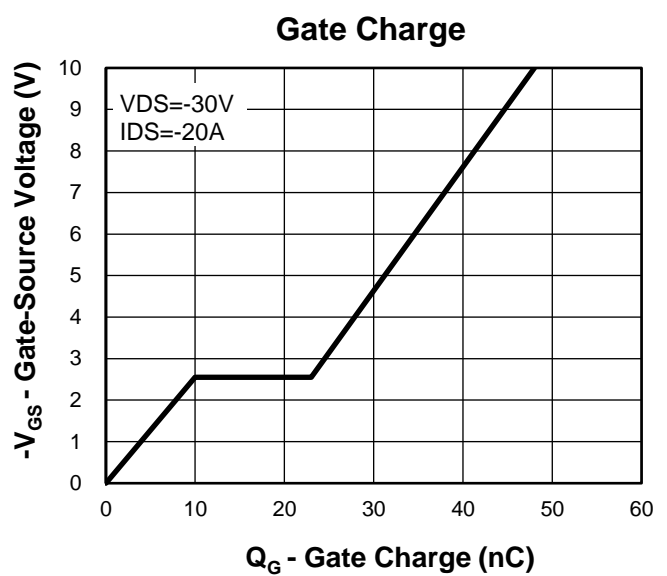
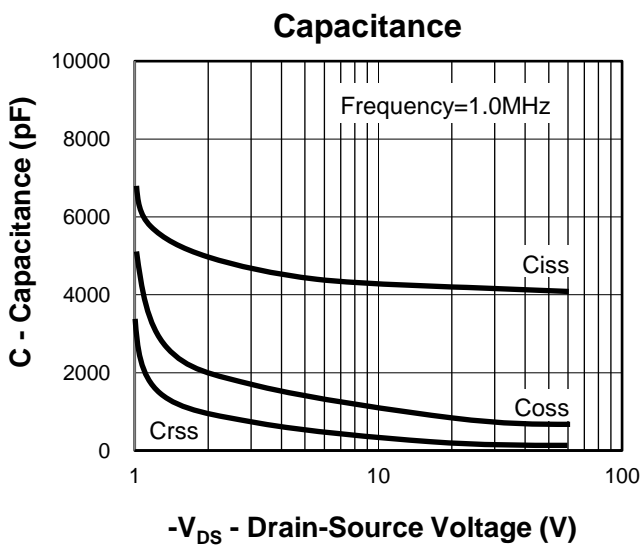
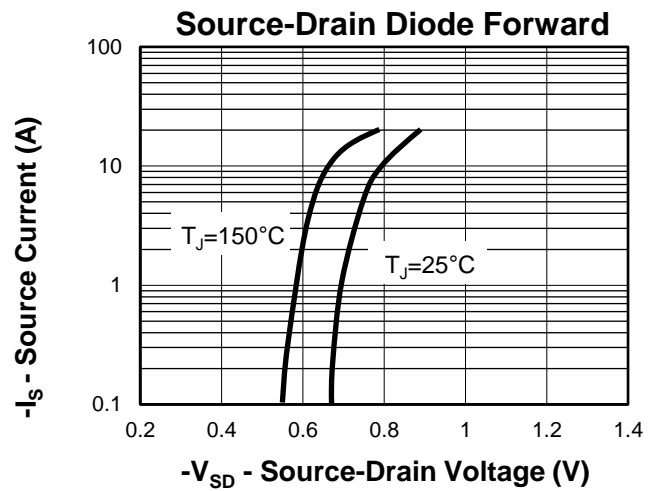
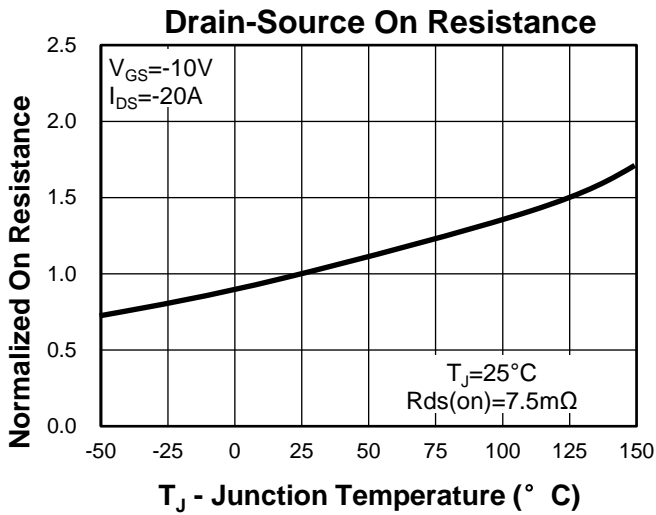
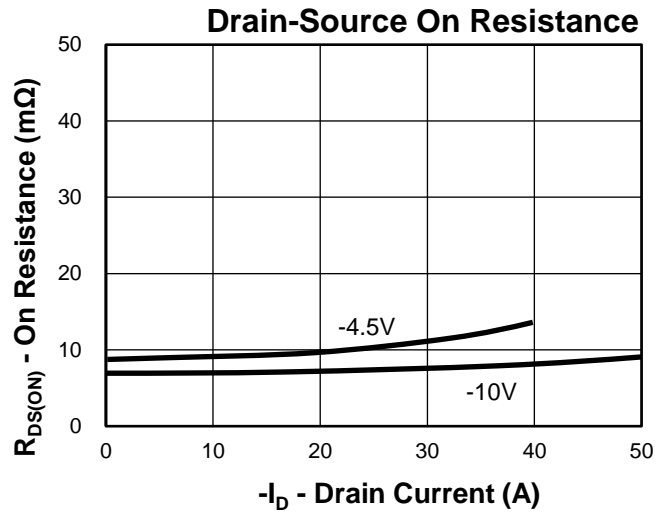
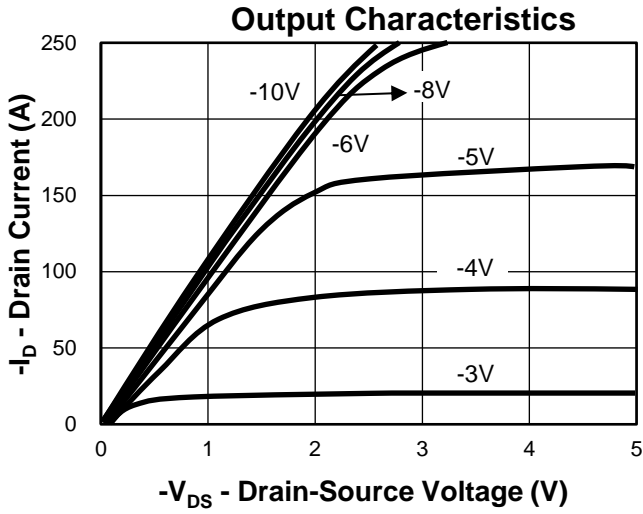
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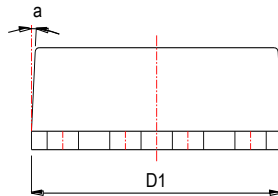
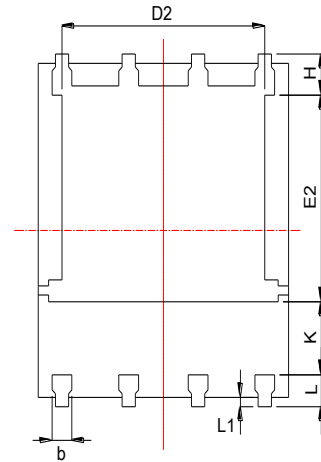
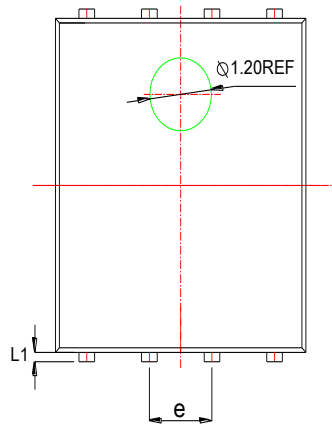
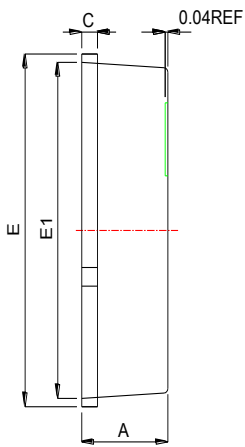
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3rd Line: Lot Number(YWWXXX)

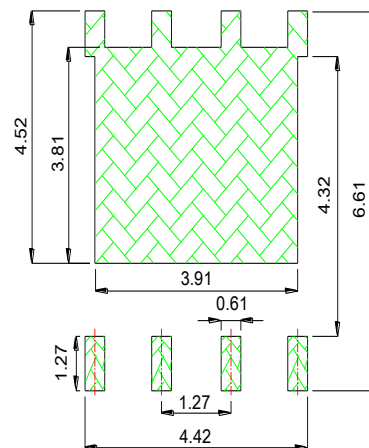
### Typical Characteristics



**Typical Characteristics**


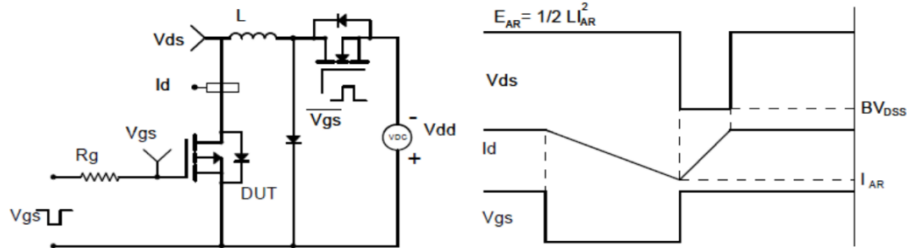
**Package Information**
**PDFN5060**


Land Pattern  
(Only for Reference)

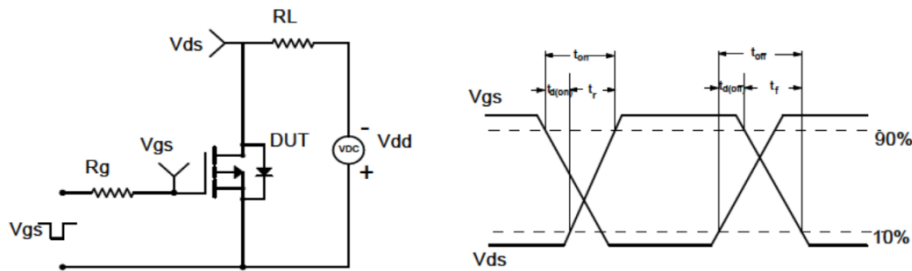


SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.90	1.00	1.10	0.035	0.039	0.043
b	0.33	0.42	0.51	0.013	0.017	0.020
c	0.20	0.25	0.30	0.008	0.010	0.012
D1	4.80	4.90	5.00	0.189	0.193	0.197
D2	3.61	3.79	3.96	0.142	0.149	0.156
E	5.90	6.00	6.10	0.232	0.236	0.240
E1	5.65	5.75	5.85	0.222	0.226	0.230
E2	3.38	3.58	3.78	0.133	0.141	0.149
e	1.27 BSC			0.050 BSC		
H	0.41	0.51	0.61	0.016	0.020	0.024
k	1.10			0.043		
L	0.51	0.61	0.71	0.020	0.024	0.028
L1	0.06	0.13	0.20	0.002	0.005	0.008
a	0°		12°	0°		12°

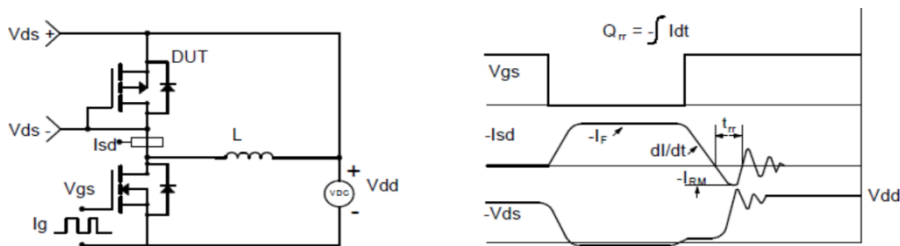
### Avalanche Test Circuit and Waveforms



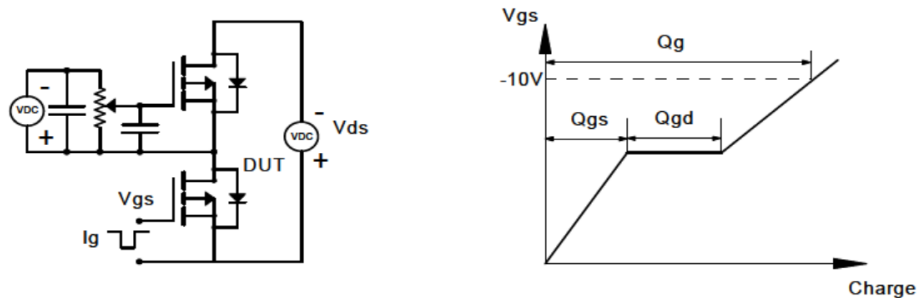
### Switching Time Test Circuit and Waveforms



### Diode Recovery Test Circuit and Waveforms



### Gate Charge Test Circuit and Waveform



### Customer Service

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