

Features

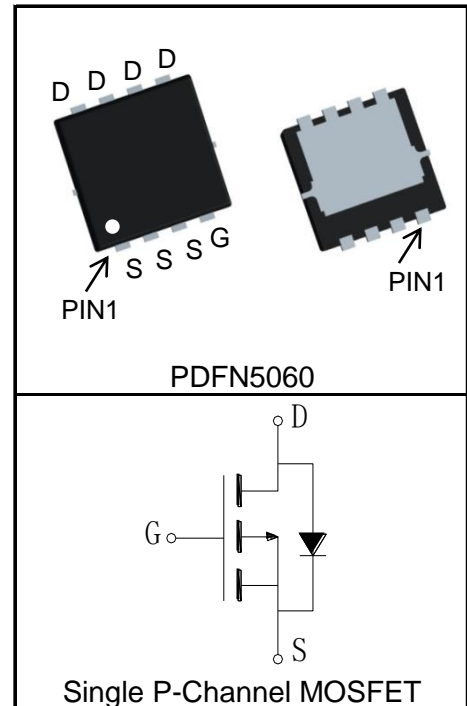
- -20V/-160A,
 $R_{DS(ON)} = 1.5m\Omega(Typ.)@V_{GS}=-4.5V$
 $R_{DS(ON)} = 2m\Omega(Typ.)@V_{GS}=-2.5V$
 $R_{DS(ON)} = 3.3m\Omega(Typ.)@V_{GS}=-1.8V$
- Ultra Low $R_{DS(ON)}$
- Super High Dense Cell Design
- Fast Switching Speed
- 100% avalanche tested

Applications

- Switching Application Systems



Pin Description



Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
Common Ratings ($T_C=25^\circ C$ Unless Otherwise Noted)			
V_{DSS}	Drain-Source Voltage	-20	V
V_{GSS}	Gate-Source Voltage	± 12	V
T_J	Maximum Junction Temperature	150	$^\circ C$
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
I_S	Diode Continuous Forward Current	$T_C=25^\circ C$ -160	A
Mounted on Large Heat Sink			
$I_{DP}^{①}$	300 μs Pulse Drain Current Tested	$T_C=25^\circ C$ -640	A
$I_D^{②}$	Continuous Drain Current@ $T_C(V_{GS}=-4.5V)$	$T_C=25^\circ C$ -160	A
		$T_C=100^\circ C$ -101	
	Continuous Drain Current@ $T_A(V_{GS}=-4.5V)^{③}$	$T_A=25^\circ C$ -35	
		$T_A=70^\circ C$ -28	
P_D	Maximum Power Dissipation@ T_C	$T_C=25^\circ C$ 86	W
		$T_C=100^\circ C$ 34	
	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	1.46	°C/W
$R_{\theta JA}$ ③	Thermal Resistance-Junction to Ambient	30	°C/W
Drain-Source Avalanche Ratings			
E_{AS} ④	Avalanche Energy, Single Pulsed	56	mJ

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

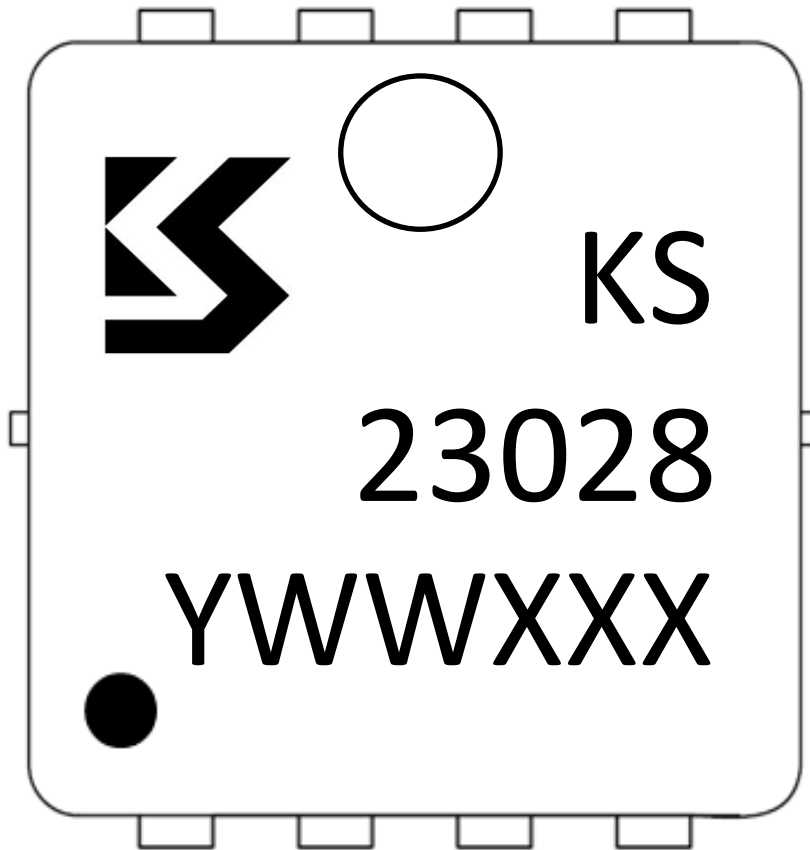
Symbol	Parameter	Test Condition	KS23028NA			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=-250\mu A$	-20			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=-20V, V_{GS}=0V$			-1	μA
		$T_J=125^\circ\text{C}$			-30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=-250\mu A$	-0.4	-0.7	-1	V
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 12V, V_{DS}=0V$			± 100	nA
$R_{DS(ON)}$ ⑤	Drain-Source On-state Resistance	$V_{GS}=-4.5V, I_{DS}=-20A$		1.5	2	$m\Omega$
		$V_{GS}=-2.5V, I_{DS}=-16A$		2	2.8	$m\Omega$
		$V_{GS}=-1.8V, I_{DS}=-10A$		3.3	4.7	$m\Omega$
Diode Characteristics						
V_{SD} ⑤	Diode Forward Voltage	$I_{SD}=-20A, V_{GS}=0V$		-0.73	-1.2	V
t_{rr}	Reverse Recovery Time	$I_{SD}=-20A, dI_{SD}/dt=100A/\mu s$		43		ns
Q_{rr}	Reverse Recovery Charge			162		nC
Dynamic Characteristics ⑥						
R_G	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$		3		Ω
C_{iss}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=-10V,$ Frequency=1.0MHz		10130		μF
C_{oss}	Output Capacitance			1290		
C_{rss}	Reverse Transfer Capacitance			585		
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=-10V, I_{DS}=-20A,$ $V_{GS}=-4.5V, R_G=3\Omega$		33		ns
t_r	Turn-on Rise Time			59		
$t_{d(OFF)}$	Turn-off Delay Time			128		
t_f	Turn-off Fall Time			77		
Gate Charge Characteristics ⑥						
Q_g	Total Gate Charge	$V_{DS}=-10V, V_{GS}=-4.5V,$ $I_{DS}=-20A$		82		nC
Q_{gs}	Gate-Source Charge			16		
Q_{gd}	Gate-Drain Charge			15		

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} , $I_{AS} = -15\text{A}$, $L = 0.5\text{mH}$, $V_{DD} = -10\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$, 100% tested and guaranteed.
- 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
KS23028NA	PDFN5060	Tape&Reel	5000	13"	12mm

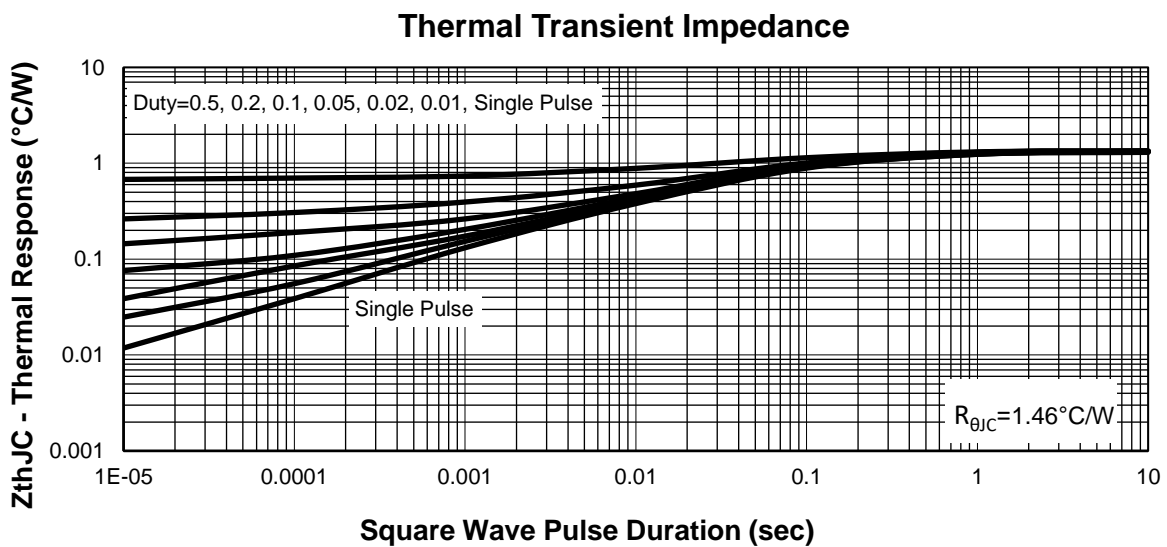
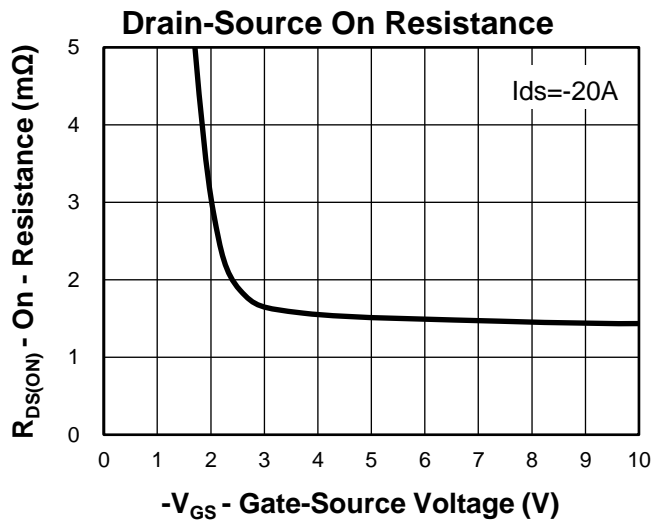
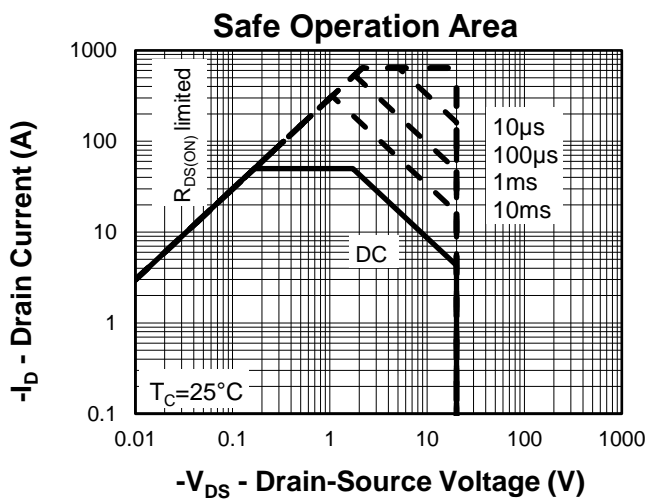
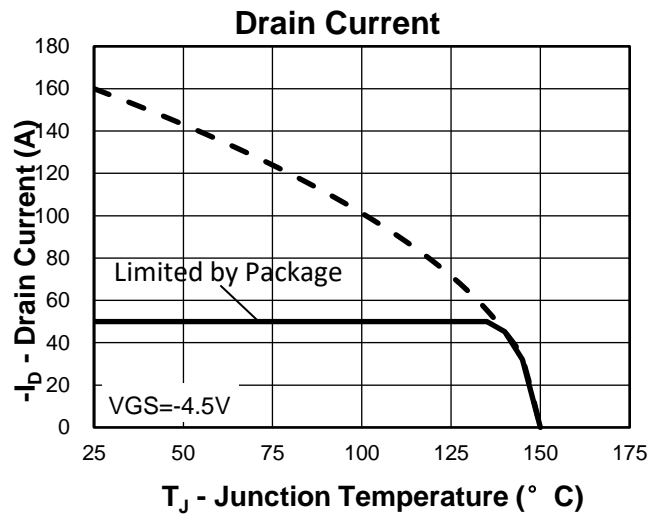
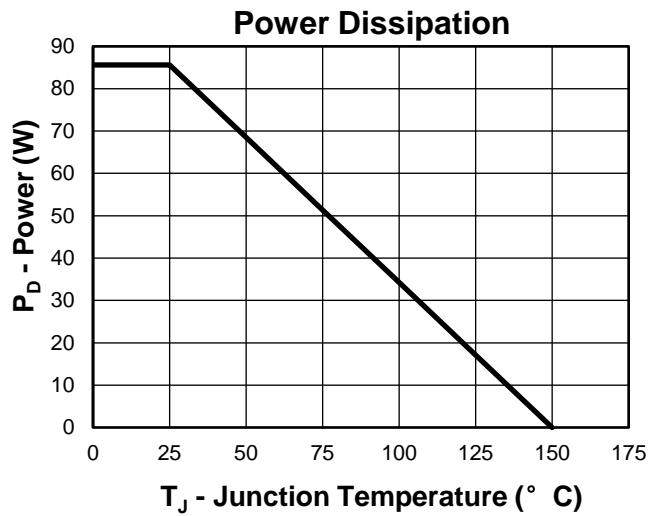


1st Line: Kwansemi LOGO, Kwansemi Code(KS)

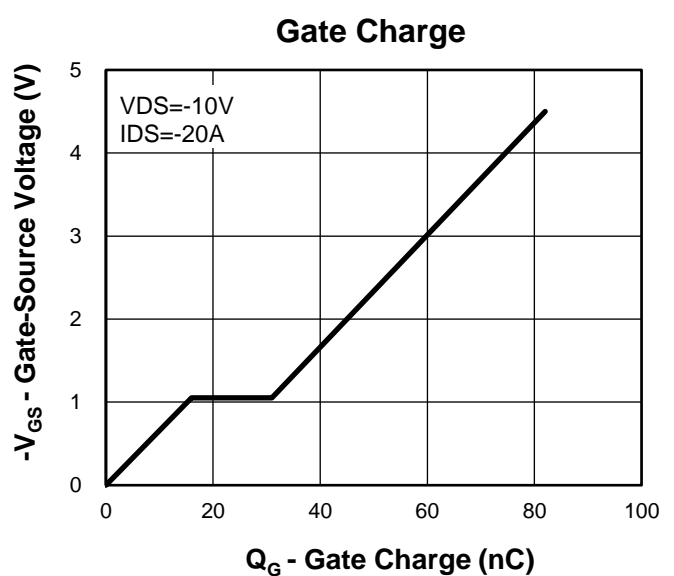
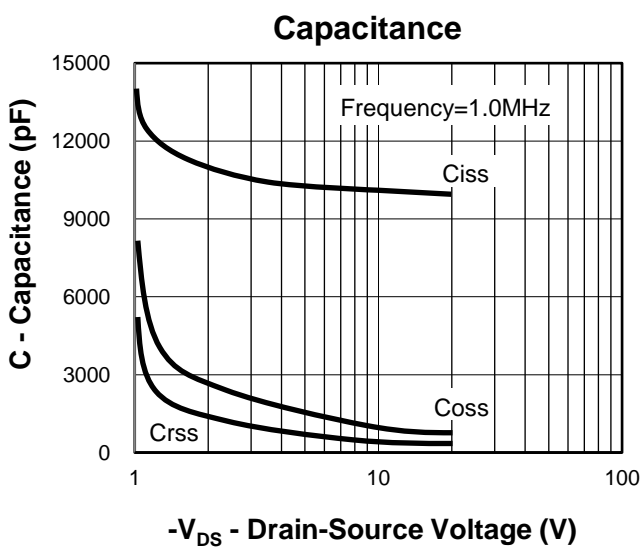
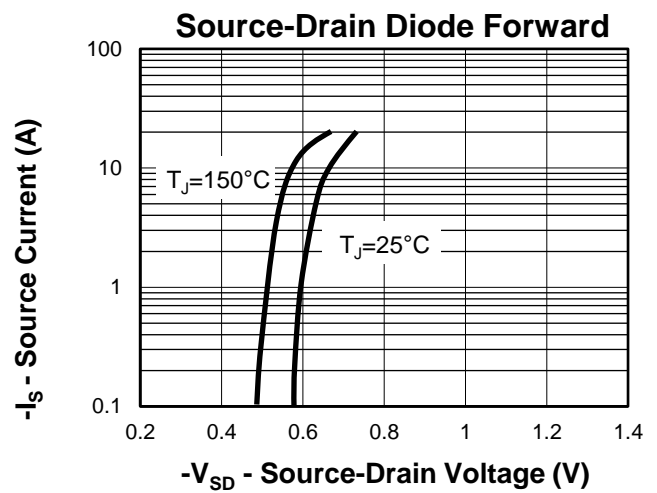
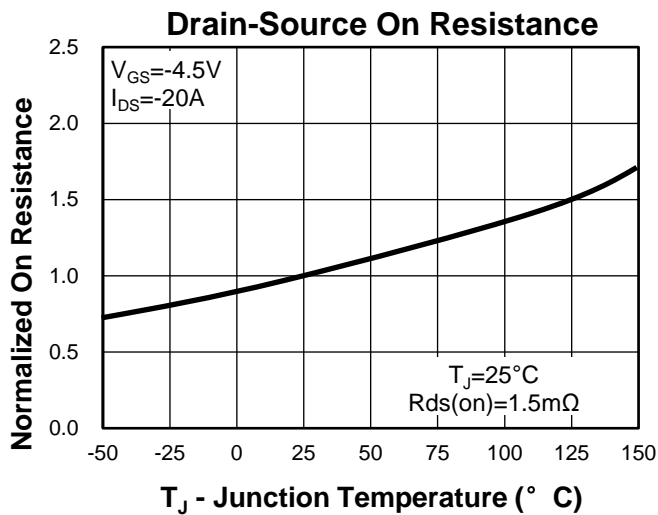
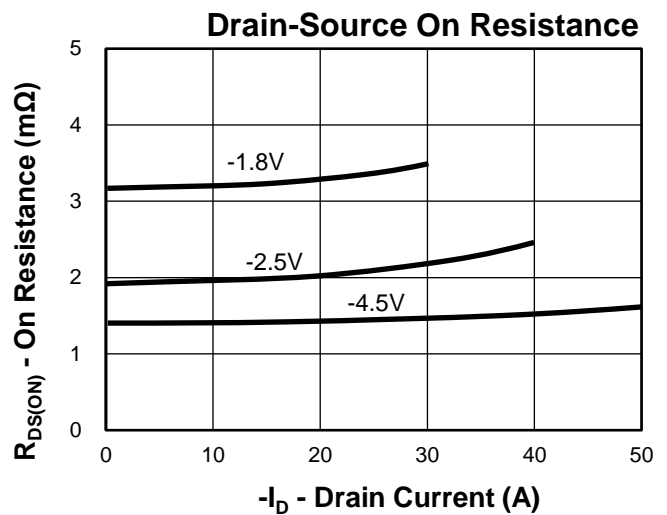
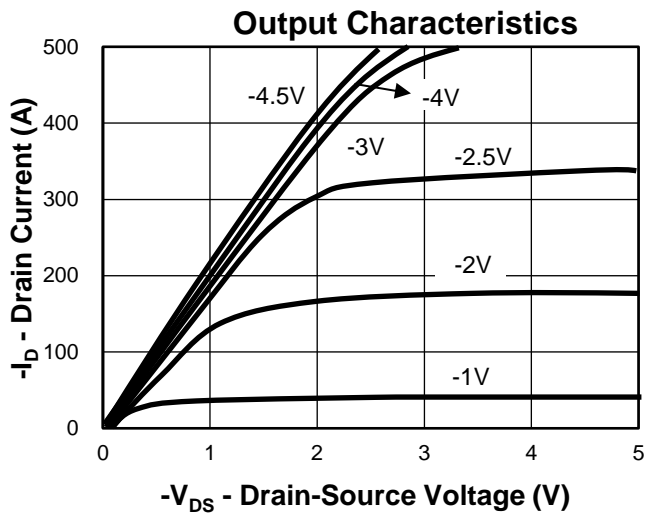
2nd Line: Part Number(23028)

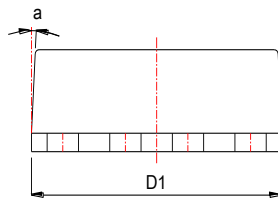
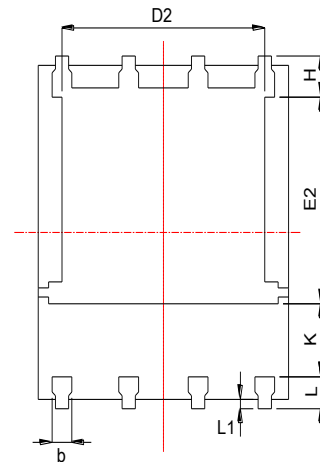
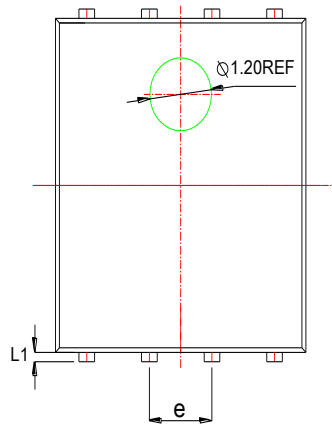
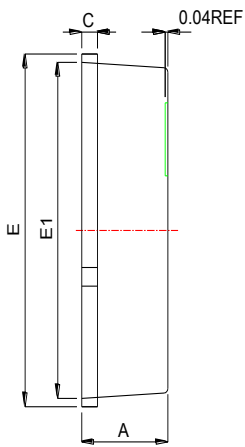
3rd Line: Lot Number(YWWXXX)

Typical Characteristics

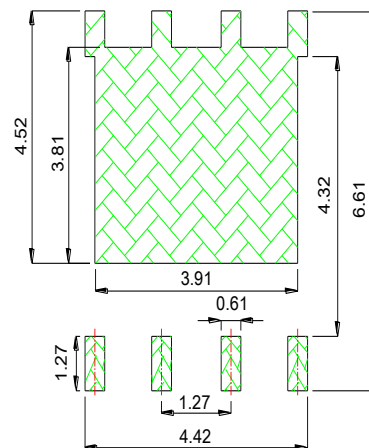


Typical Characteristics



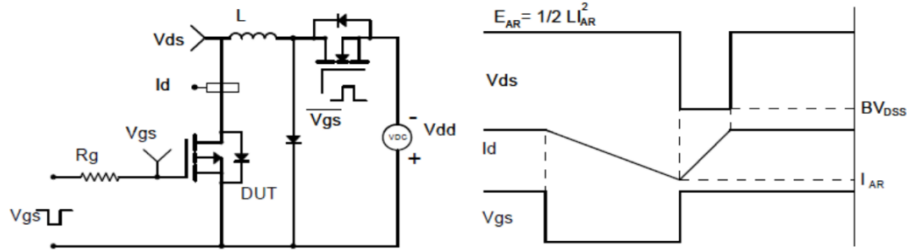
Package Information
PDFN5060


Land Pattern
(Only for Reference)

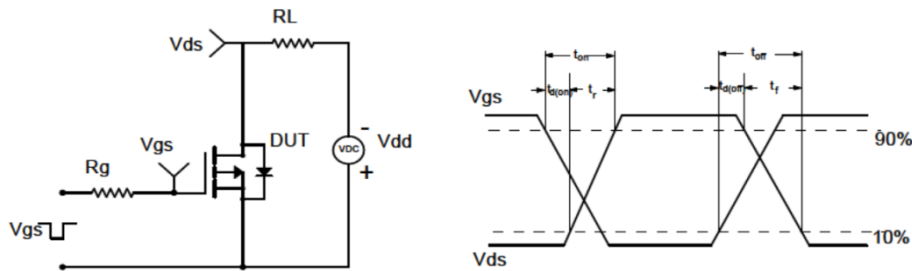


SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.90	1.00	1.10	0.035	0.039	0.043
b	0.33	0.42	0.51	0.013	0.017	0.020
c	0.20	0.25	0.30	0.008	0.010	0.012
D1	4.80	4.90	5.00	0.189	0.193	0.197
D2	3.61	3.79	3.96	0.142	0.149	0.156
E	5.90	6.00	6.10	0.232	0.236	0.240
E1	5.65	5.75	5.85	0.222	0.226	0.230
E2	3.38	3.58	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°

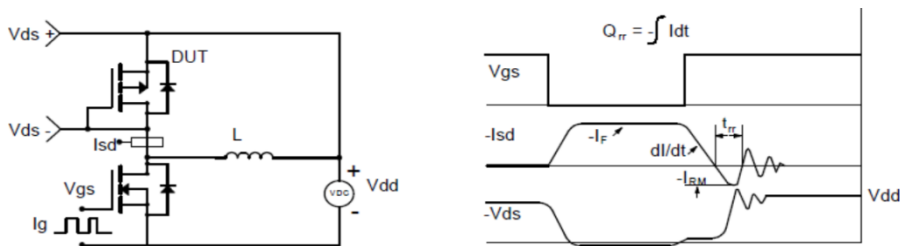
Avalanche Test Circuit and Waveforms



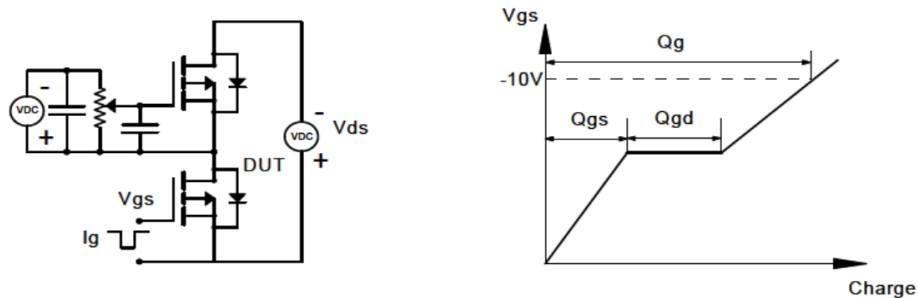
Switching Time Test Circuit and Waveforms



Diode Recovery Test Circuit and Waveforms



Gate Charge Test Circuit and Waveform



Customer Service

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