

Features

- -40V/-60A,
 $R_{DS(ON)} = 7m\Omega(Typ.)@V_{GS} = -10V$
 $R_{DS(ON)} = 10m\Omega(Typ.)@V_{GS} = -4.5V$
- Low $R_{DS(ON)}$
- Super High Dense Cell Design
- Fast Switching Speed
- 100% avalanche tested

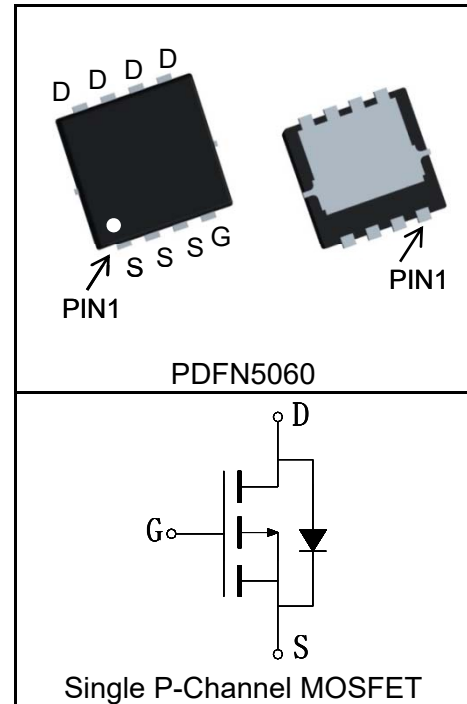
Applications

- Switching Application Systems



Halogen-Free

Pin Description



Absolute Maximum Ratings

Symbol	Parameter		Rating	Unit
Common Ratings (T _C =25°C Unless Otherwise Noted)				
V _{DSS}	Drain-Source Voltage		-40	V
V _{GSS}	Gate-Source Voltage		±20	
T _J	Maximum Junction Temperature		150	°C
T _{STG}	Storage Temperature Range		-55 to 150	°C
I _S	Diode Continuous Forward Current	T _C =25°C	-60	A
Mounted on Large Heat Sink				
I _{DP} ^①	300μs Pulse Drain Current Tested	T _C =25°C	-240	A
I _D ^②	Continuous Drain Current@T _C (V _{GS} =-10V)	T _C =25°C	-60	A
		T _C =100°C	-38	
	Continuous Drain Current@T _A (V _{GS} =-10V) ^③	T _A =25°C	-15	
		T _A =70°C	-12	
P _D	Maximum Power Dissipation@T _C	T _C =25°C	56	W
		T _C =100°C	22	
	Maximum Power Dissipation@T _A ^③	T _A =25°C	3.5	
		T _A =70°C	2.3	

Symbol	Parameter	Rating	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	2.2	$^{\circ}\text{C/W}$
$R_{\theta JA}^{(3)}$	Thermal Resistance-Junction to Ambient	35	$^{\circ}\text{C/W}$
Drain-Source Avalanche Ratings			
$E_{AS}^{(4)}$	Avalanche Energy, Single Pulsed	100	mJ

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

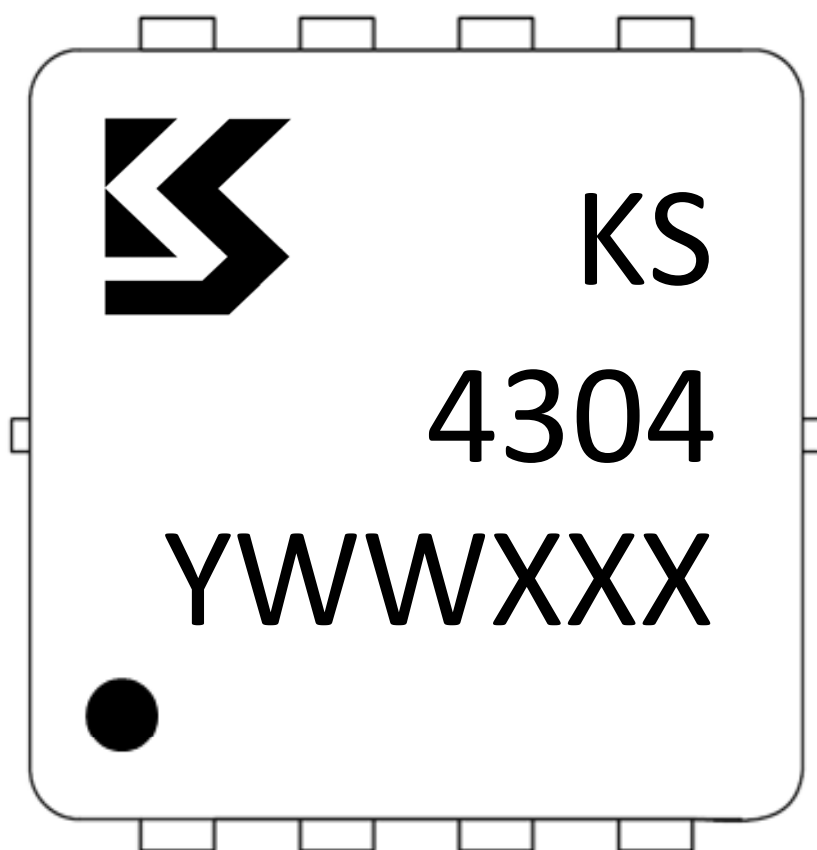
Symbol	Parameter	Test Condition	KS4304NA			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =-250μA	-40			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-40V, V _{GS} =0V			-1	μA
		T _J =125°C			-30	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =-250μA	-1.3	-1.6	-2.4	V
I _{GSS}	Gate Leakage Current	V _{GS} =±20V, V _{DS} =0V			±100	nA
R _{DS(ON)} ^⑤	Drain-Source On-state Resistance	V _{GS} =-10V, I _{DS} =-20A		7	9	mΩ
		V _{GS} =-4.5V, I _{DS} =-15A		10	13	mΩ
Diode Characteristics						
V _{SD} ^⑤	Diode Forward Voltage	I _{SD} =-20A, V _{GS} =0V		-0.84	-1.2	V
t _{rr}	Reverse Recovery Time	I _{SD} =-20A, dI _{SD} /dt=100A/μs		29		ns
Q _{rr}	Reverse Recovery Charge			167		nC
Dynamic Characteristics ^⑥						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz		7.7		Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-20V, Frequency=1.0MHz		5120		pF
C _{oss}	Output Capacitance			490		
C _{rss}	Reverse Transfer Capacitance			415		
t _{d(ON)}	Turn-on Delay Time	V _{DD} =-20V, I _{DS} =-20A, V _{GS} =-10V, R _G =3Ω		20		ns
t _r	Turn-on Rise Time			22		
t _{d(OFF)}	Turn-off Delay Time			86		
t _f	Turn-off Fall Time			39		
Gate Charge Characteristics ^⑥						
Q _g	Total Gate Charge	V _{DS} =-20V, V _{GS} =-10V, I _{DS} =-20A		85		nC
Q _{gs}	Gate-Source Charge			17		
Q _{gd}	Gate-Drain Charge			20		

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} , $I_{AS} = -20\text{A}$, $L = 0.5\text{mH}$, $V_{DD} = -20\text{V}$, $R_G = 25\Omega$, 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.

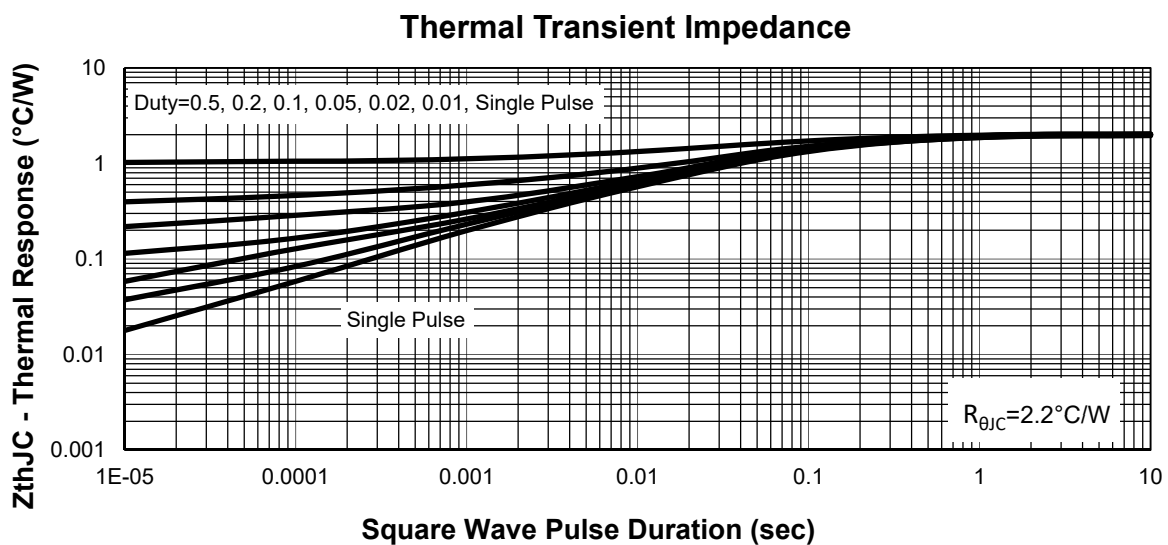
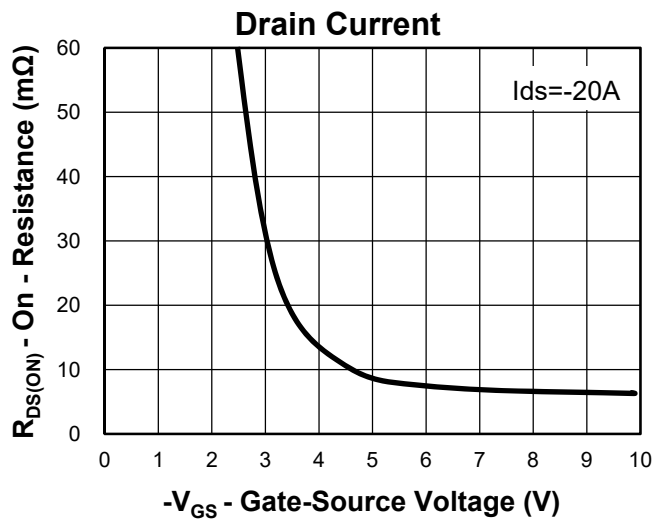
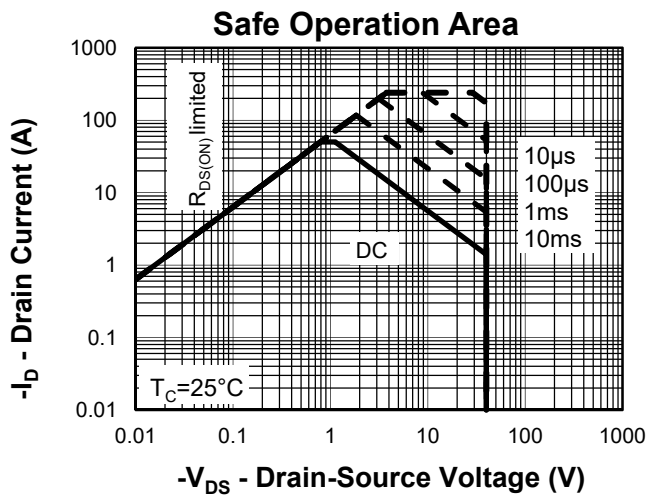
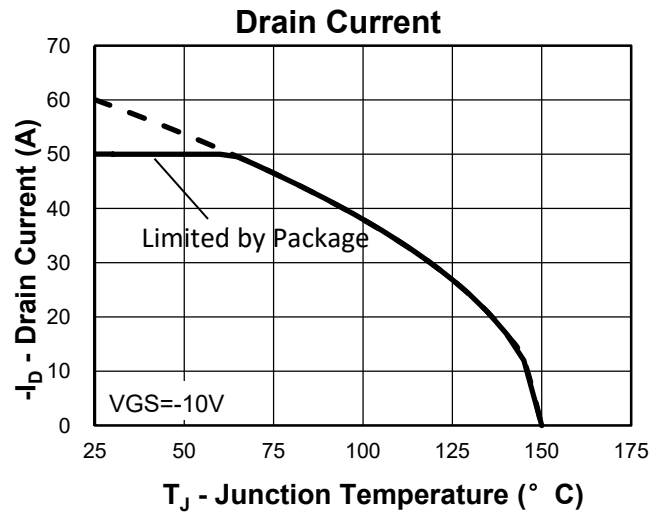
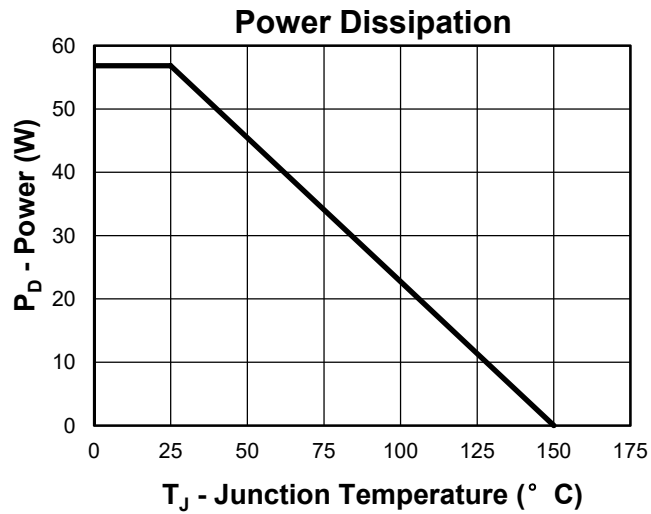
Ordering and Marking Information

Device	Package	Packaging	Quantity	Reel Size	Tape width
KS4304NA	PDFN5060	Tape&Reel	5000	13"	12mm

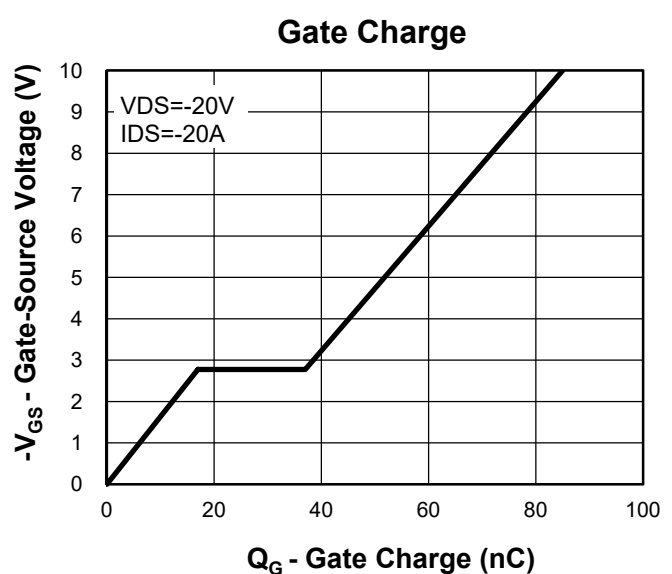
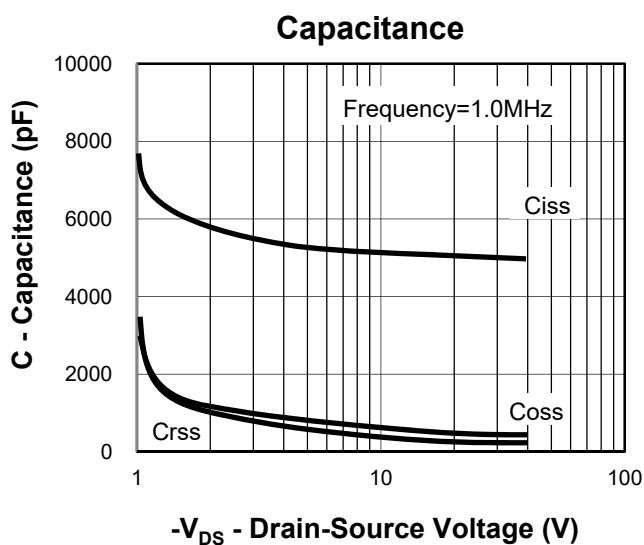
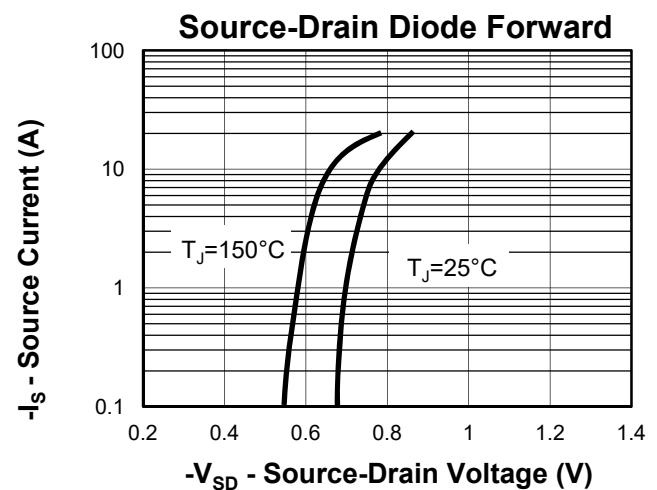
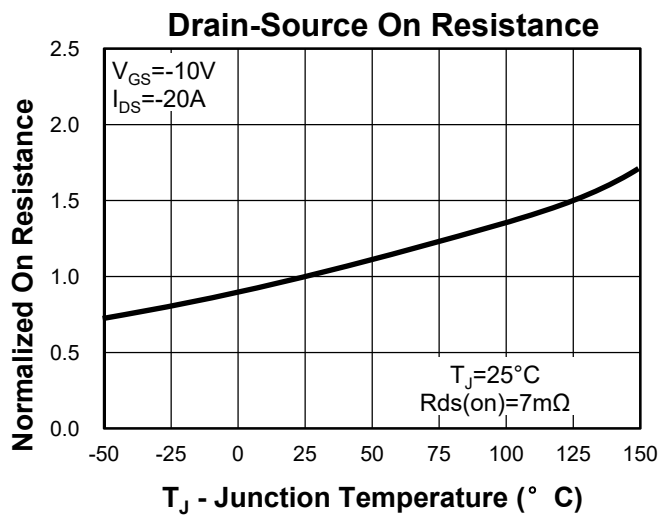
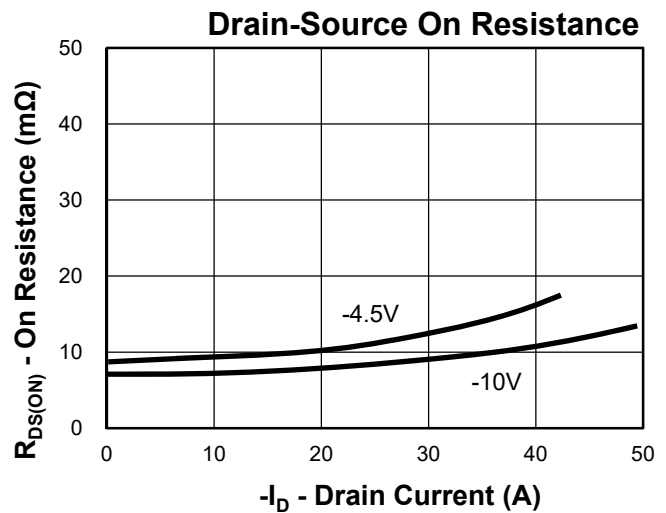
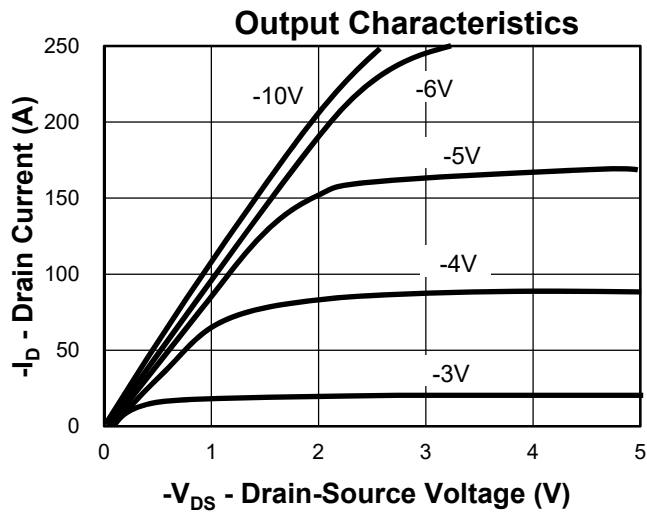


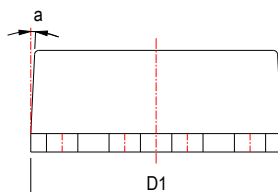
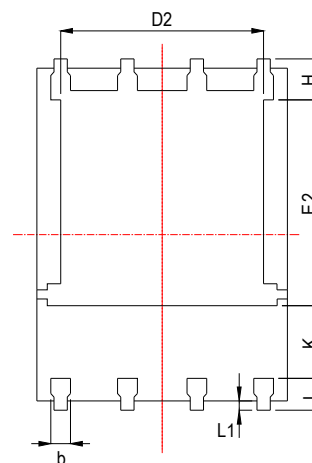
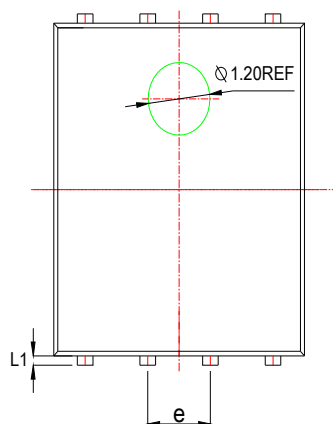
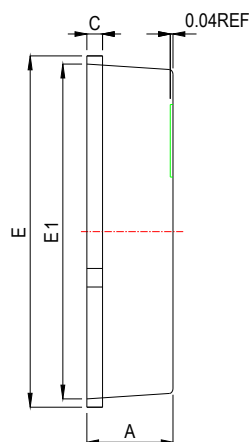
Y =Year,2017-A,2018-B,etc.
 WW =Week.
 XXX =Lot number.

Typical Characteristics

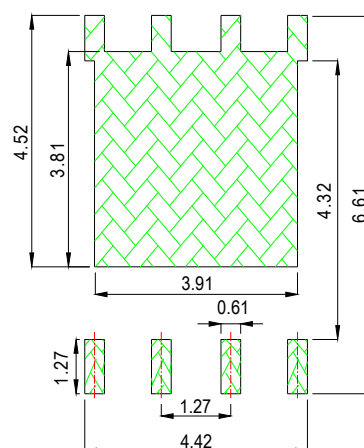


Typical Characteristics



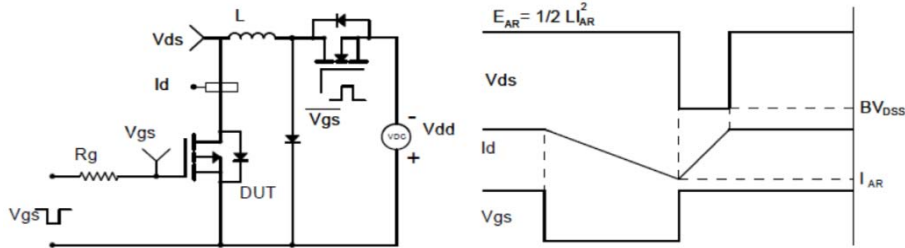
Package Information
PDFN5060


Land Pattern
(Only for Reference)

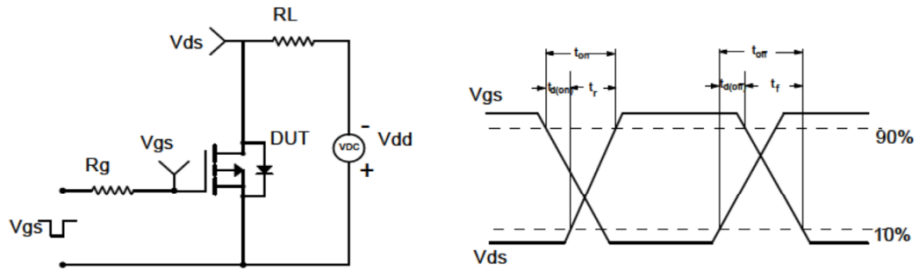


SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.90	1.00	1.10	0.035	0.039	0.043
b	0.33	0.42	0.51	0.013	0.017	0.020
c	0.20	0.25	0.30	0.008	0.010	0.012
D1	4.80	4.90	5.00	0.189	0.193	0.197
D2	3.61	3.79	3.96	0.142	0.149	0.156
E	5.90	6.00	6.10	0.232	0.236	0.240
E1	5.65	5.75	5.85	0.222	0.226	0.230
E2	3.38	3.58	3.78	0.133	0.141	0.149
e	1.27 BSC			0.005 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°

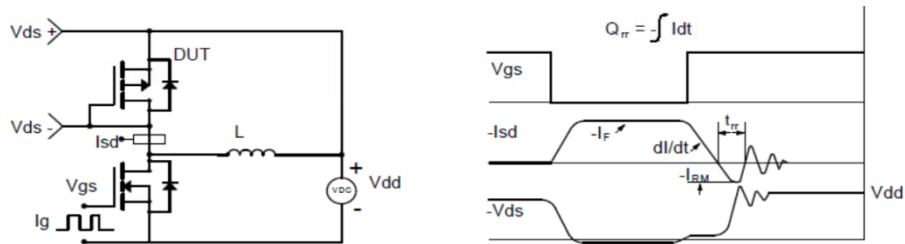
Avalanche Test Circuit and Waveforms



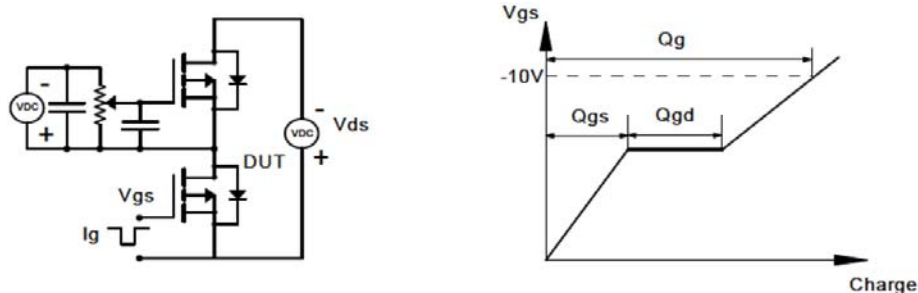
Switching Time Test Circuit and Waveforms



Diode Recovery Test Circuit and Waveforms



Gate Charge Test Circuit and Waveform



Customer Service

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