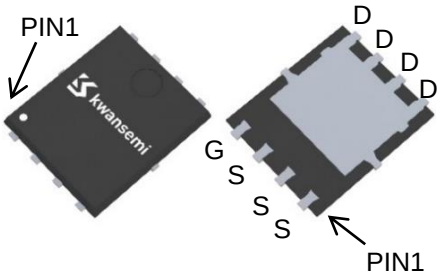
KSC2040NAT

Single N-Channel Advanced Power MOSFET

Features

- 200V/22A,
  $R_{DS\,(ON)}$ =45mΩ(Typ.)@V_{GS}=10V
- Excellent Q_G x $R_{DS(on)}$ product(FOM)
- SGT Technology
- 100% avalanche tested

Pin Description



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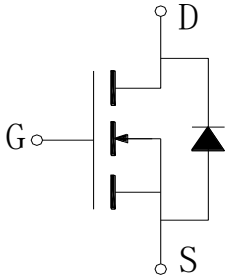


Single N-Channel MOSFET

Applications

- USB-PD Adaptors
- Synchronous Rectification

RoHS Pb HF Halogen-Free

Absolute Maximum Ratings

Symbol	Parameter		Rating	Unit
Common Ratings (T_C=25°C Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage		200	V
V_{GSS}	Gate-Source Voltage		±20	
T_{Jmax}	Maximum Junction Temperature		150	°C
T_J,T_{STG}	Operating and Storage Temperature Range		-55 to 150	°C
I_S	Diode Continuous Forward Current	T_C=25°C	22	A
Mounted on Large Heat Sink				
I_{DP} ①	Pulse Drain Current	T_C=25°C	88	A
I_D ②	Continuous Drain Current@T_C(V_{GS}=10V)	T_C=25°C	22	A
		T_C=100°C	13	
	Continuous Drain Current@T_A(V_{GS}=10V) ③	T_A=25°C	5	
		T_A=70°C	4	
P_D	Maximum Power Dissipation@T_C	T_C=25°C	65	W
		T_C=100°C	26	
	Maximum Power Dissipation@T_A ③	T_A=25°C	4.2	
		T_A=70°C	2.7	

Symbol	Parameter	Rating	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	1.9	°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	210	mJ

Electrical Characteristics (T_C=25°C Unless Otherwise Noted)

Symbol	Parameter	Test Condition	KSC2040NAT			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=250μA	200			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=200V, V_{GS}=0V			1	μA
		T_J=125°C			30	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250μA	2.5	3.5	4.5	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		45	55	mΩ
Diode Characteristics						
V_{SD} ⑤	Diode Forward Voltage	I_{SD}=20A, V_{GS}=0V		0.89	1.2	V
t_{rr}	Reverse Recovery Time	I_{SD}=20A, dI_{SD}/dt=100A/μs		38		ns
Q_{rr}	Reverse Recovery Charge			115		nC
Dynamic Characteristics ⑥						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=1MHz		1.1		Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=100V, Frequency=1.0MHz		2380		pF
C_{oss}	Output Capacitance			95		
C_{rss}	Reverse Transfer Capacitance			15		
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=100V, I_{DS}=20A, V_{GS}=10V,R_G=3Ω		12		ns
t_r	Turn-on Rise Time			21		
$t_{d(OFF)}$	Turn-off Delay Time			33		
t_f	Turn-off Fall Time			14		
Gate Charge Characteristics ⑥						
Q_g	Total Gate Charge	V_{DS}=100V, V_{GS}=10V, I_{DS}=20A		34		nC
Q_{gs}	Gate-Source Charge			13		
Q_{gd}	Gate-Drain Charge			7.7		

Notes:

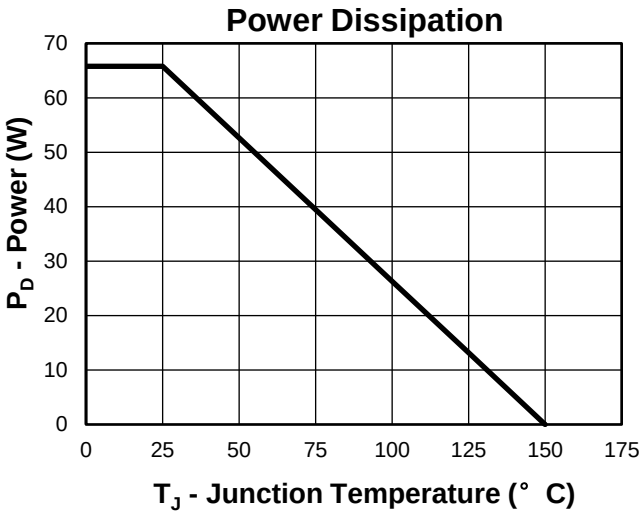
①Pulse width limited by safe operating area.
②Calculated continuous current based on maximum allowable junction temperature.
③When mounted on 1 inch square copper board, t≤10sec.
④Limited by T_{Jmax}, Starting T_J = 25°C, I_{ASmax} =29A, L=0.5mH, V_{DD} = 48V, R_G = 25Ω, V_{GS}=10V.Part not recommended for use above this value.100% Final Test at I_{AS}=15A, L=0.5mH.
⑤Pulse test;Pulse width≤300μs, duty cycle≤2%.
⑥Guaranteed by design, not subject to production testing.

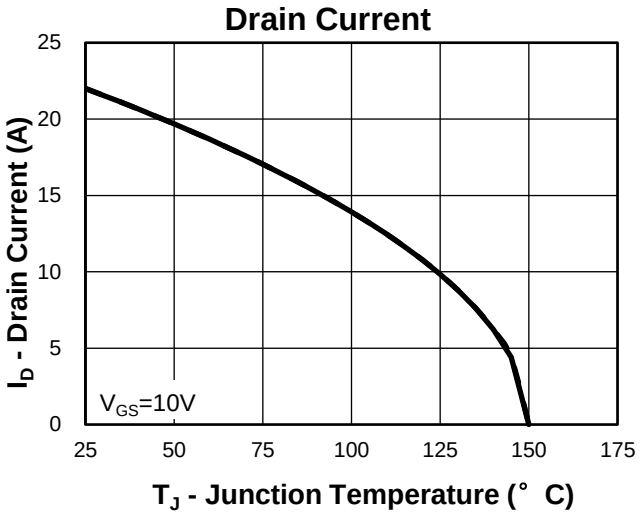
Ordering and Marking Information

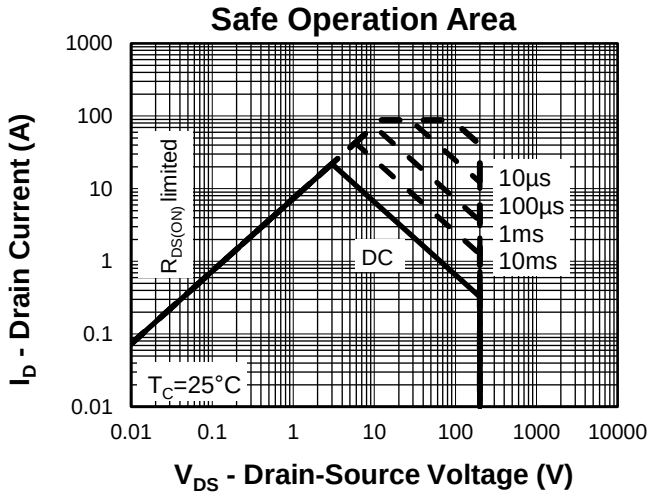
Device	Package	Packaging	Quantity	Reel Size	Tape width
KSC2040NAT	PDFN5060	Tape&Reel	5000	13"	12mm

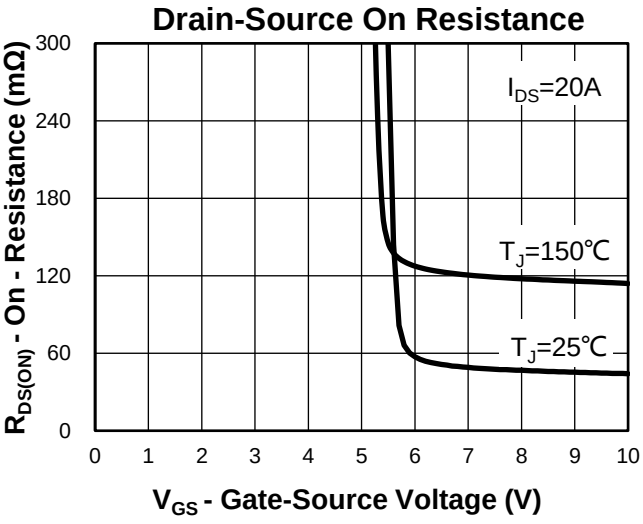
1st Line: Kwansemi LOGO，Kwansemi Code(KS)
2nd Line: Part Number(C2040T)
3rd Line: Lot Number(YWWXXX)

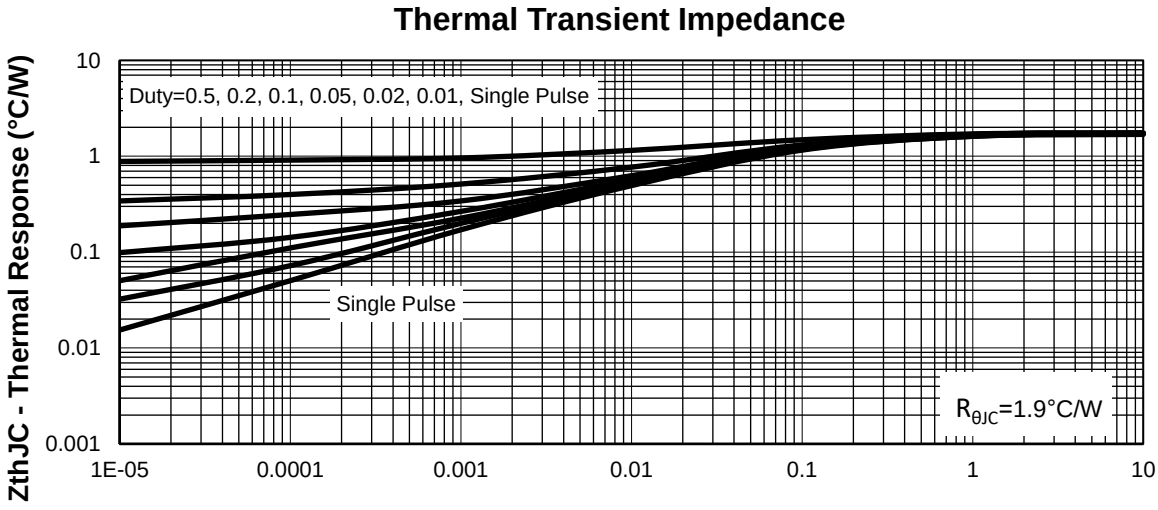
Typical Characteristics











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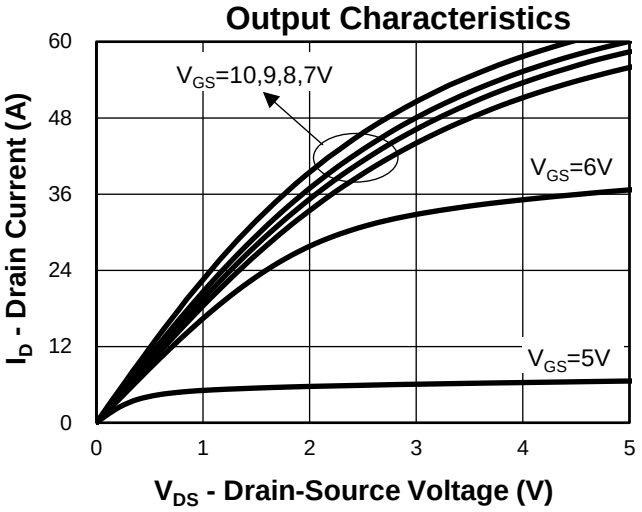
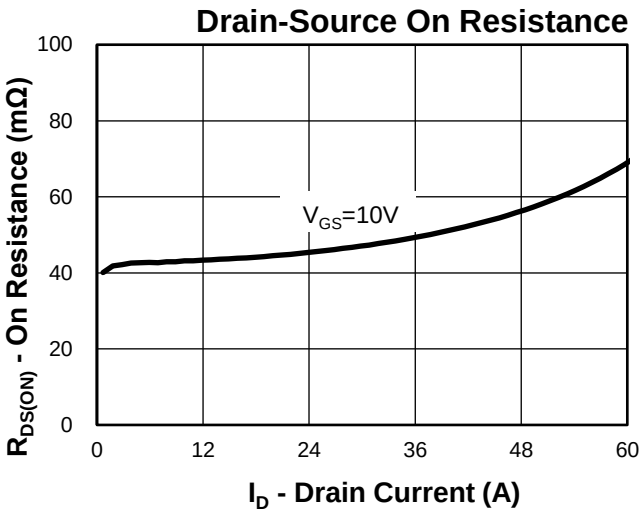
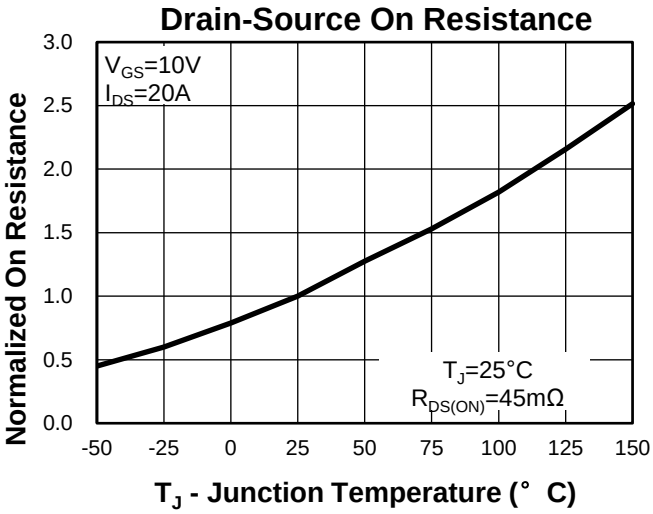
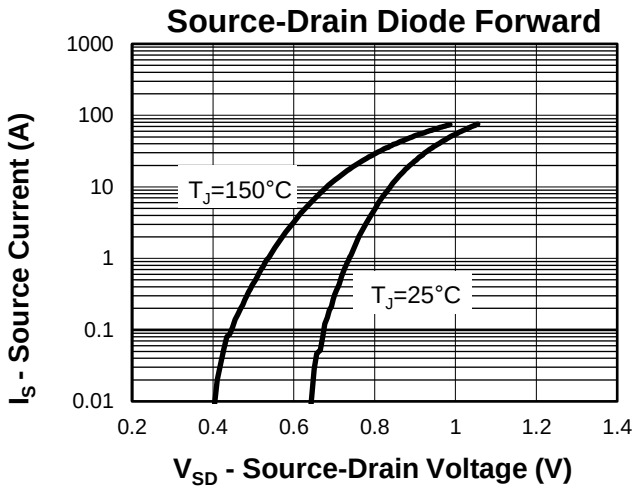
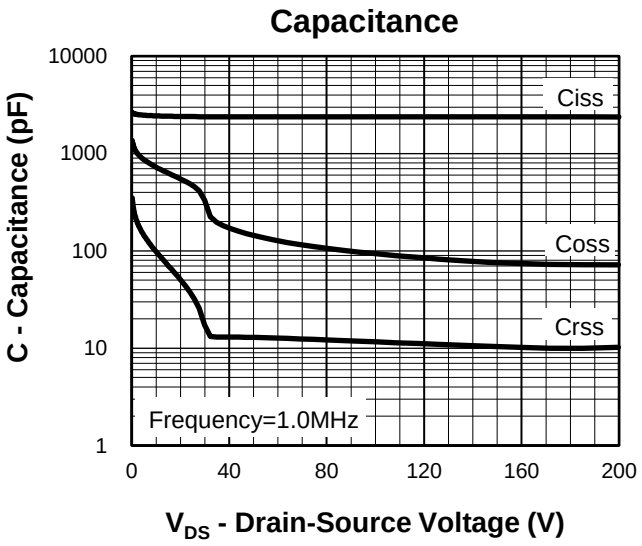
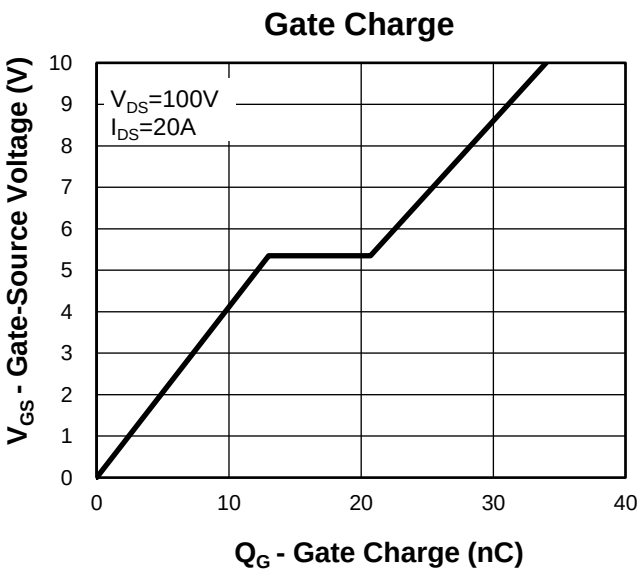






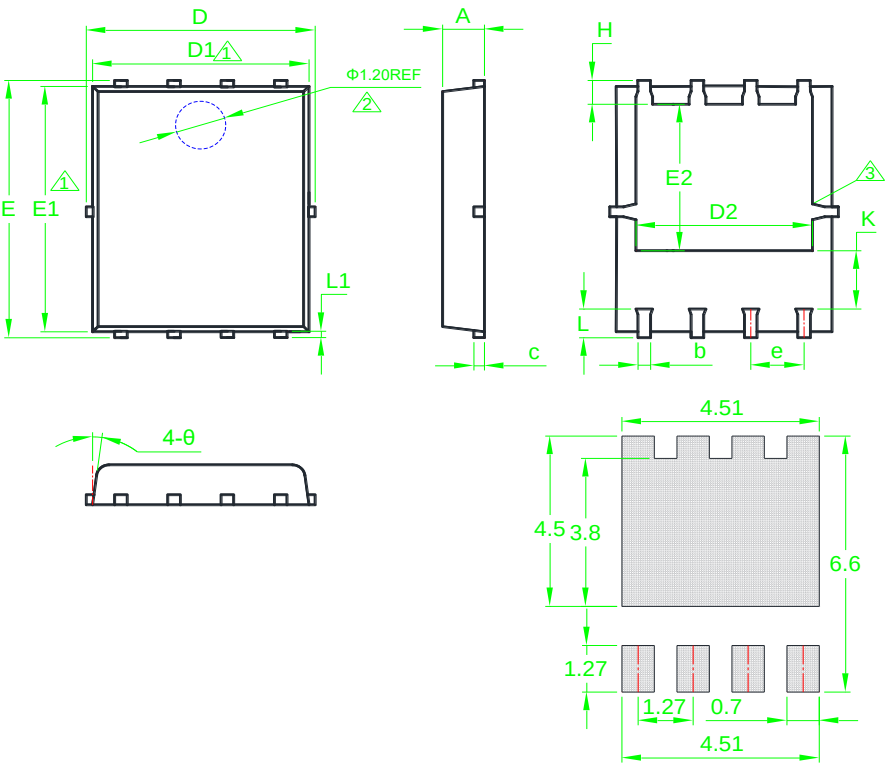






Package Information

PDFN5060

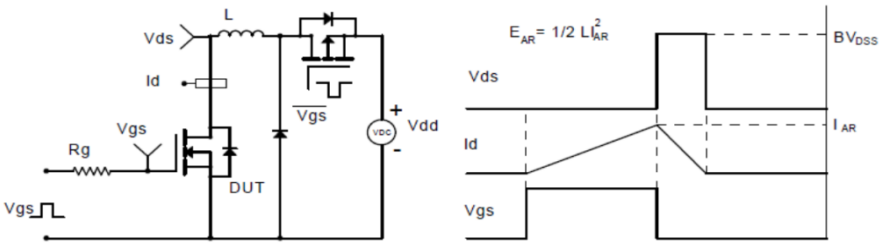


Land pattern
(Only for Reference)

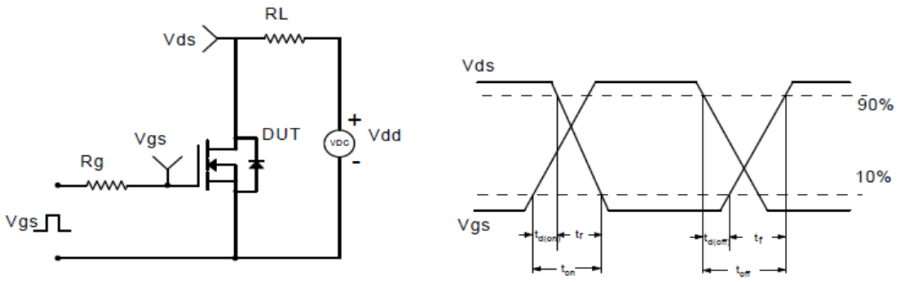
SYMBOL	MM			INCH			SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX		MIN	NOM	MAX	MIN	NOM	MAX
A	0.90	1.00	1.20	0.035	0.039	0.047	E2	3.27	3.50	3.90	0.129	0.138	0.154
b	0.25	*	0.50	0.010	*	0.020	e	1.27BSC			0.050BSC		
c	0.20	0.25	0.30	0.008	0.010	0.012	H	0.41	0.51	0.71	0.016	0.020	0.028
D	5.15BSC			0.203BSC			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.

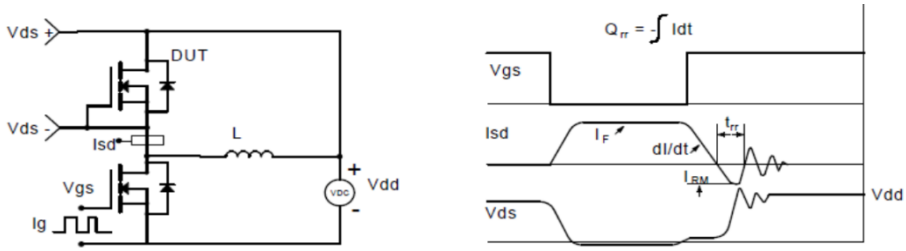
Avalanche Test Circuit and Waveforms



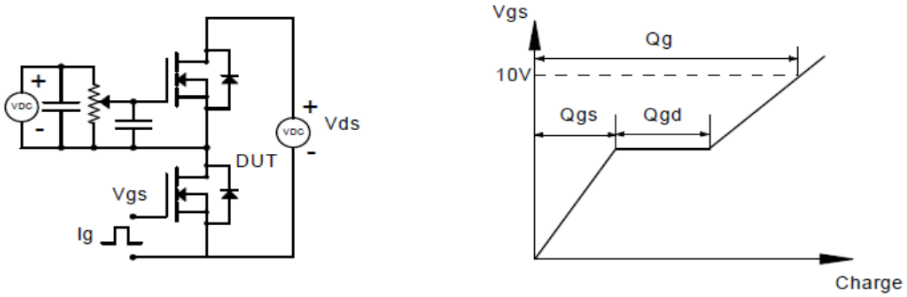
Switching Time Test Circuit and Waveforms



Diode Recovery Test Circuit and Waveforms



Gate Charge Test Circuit and Waveform



Customer Service

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