

Features

- N-Channel
30V/23A,
 $R_{DS(ON)} = 15m\Omega$ (Typ.) @ $V_{GS}=10V$
 $R_{DS(ON)} = 20m\Omega$ (Typ.) @ $V_{GS}=4.5V$
- P-Channel
-30V/-25A,
 $R_{DS(ON)} = 18m\Omega$ (Typ.) @ $V_{GS}=-10V$
 $R_{DS(ON)} = 28m\Omega$ (Typ.) @ $V_{GS}=-4.5V$
- Very low on-resistance
- Fast Switching

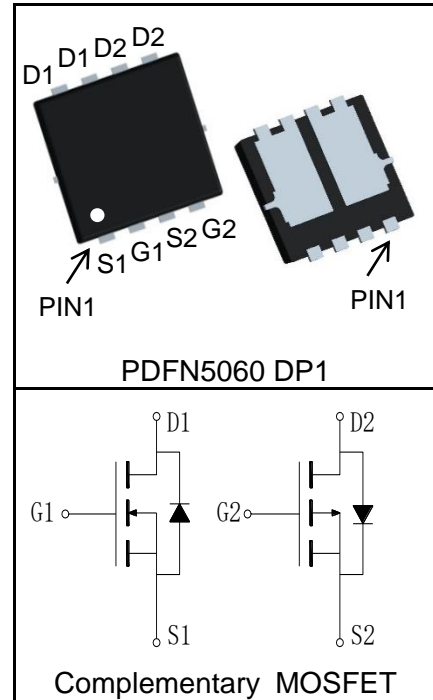
Applications

- Motor Drive Applications



Halogen-Free

Pin Description



Absolute Maximum Ratings

Symbol	Parameter		N-Channel	P-Channel	Unit
Common Ratings ($T_A=25^\circ\text{C}$ Unless Otherwise Noted)					
V_{DSS}	Drain-Source Voltage		30	-30	V
V_{GSS}	Gate-Source Voltage		± 20	± 20	
T_J	Maximum Junction Temperature		150	150	$^\circ\text{C}$
T_{STG}	Storage Temperature Range		-55 to 150	-55 to 150	$^\circ\text{C}$
I_S	Diode Continuous Forward Current	$T_C=25^\circ\text{C}$	23	-25	A
Mounted on Large Heat Sink					
$I_{DP}^{①}$	300 μs Pulse Drain Current Tested	$T_C=25^\circ\text{C}$	92	-100	A
$I_D^{②}$	Continuous Drain Current @ T_C ($V_{GS}=\pm 10V$)	$T_C=25^\circ\text{C}$	23	-25	A
		$T_C=100^\circ\text{C}$	15	-16	
	Continuous Drain Current @ T_A ($V_{GS}=\pm 10V$) ^③	$T_A=25^\circ\text{C}$	10	-9	
		$T_A=70^\circ\text{C}$	8	-7	
P_D	Maximum Power Dissipation @ T_C	$T_C=25^\circ\text{C}$	18	26	W
		$T_C=100^\circ\text{C}$	7	10	
	Maximum Power Dissipation @ T_A ^③	$T_A=25^\circ\text{C}$	3.1	3.1	
		$T_A=70^\circ\text{C}$	2	2	
$R_{\theta JC}$	Thermal Resistance-Junction to Case		7	4.8	$^\circ\text{C/W}$
$R_{\theta JA}^{③}$	Thermal Resistance-Junction to Ambient		40	40	$^\circ\text{C/W}$
Drain-Source Avalanche Ratings					
$E_{AS}^{④}$	Avalanche Energy, Single Pulsed		9	20	mJ

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

Symbol	Parameter	Test Condition	KS3640NB			Unit	
			Min.	Typ.	Max.		
Static Characteristics							
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	N	30		V	
		$V_{GS}=0V, I_{DS}=-250\mu A$	P	-30			
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=30V, V_{GS}=0V$	N		1	μA	
		$T_J=125^\circ C$			30		
		$V_{DS}=-30V, V_{GS}=0V$	P		-1		
		$T_J=125^\circ C$			-30		
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	N	1.1	1.8	2.3	V
		$V_{DS}=V_{GS}, I_{DS}=-250\mu A$	P	-1.1	-1.5	-2.3	
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	N			± 100	nA
		$V_{GS}=\pm 20V, V_{DS}=0V$	P			± 100	
$R_{DS(ON)}^{(5)}$	Drain-Source On-state Resistance	$V_{GS}=10V, I_{DS}=8A$	N		15	20	m Ω
		$V_{GS}=-10V, I_{DS}=-8A$	P		18	25	
		$V_{GS}=4.5V, I_{DS}=6A$	N		20	28	
		$V_{GS}=-4.5V, I_{DS}=-6A$	P		28	35	
Diode Characteristics							
$V_{SD}^{(5)}$	Diode Forward Voltage	$I_{SD}=7A, V_{GS}=0V$	N		0.85	1.2	V
		$I_{SD}=-7A, V_{GS}=0V$	P		-0.86	-1.2	
t_{rr}	Reverse Recovery Time	N-Channel $I_{SD}=7A, di_{SD}/dt=100A/\mu s$	N		9		ns
			P		15		
Q_{rr}	Reverse Recovery Charge	P-Channel $I_{SD}=-7A, di_{SD}/dt=100A/\mu s$	N		12		nC
			P		26		
Dynamic Characteristics⁽⁶⁾							
R_G	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1MHz$	N		1.8		Ω
			P		4.5		
C_{iss}	Input Capacitance	N-Channel $V_{GS}=0V, V_{DS}=15V,$ Frequency=1.0MHz	N		460		pF
			P		1190		
C_{oss}	Output Capacitance	P-Channel $V_{GS}=0V, V_{DS}=-15V,$ Frequency=1.0MHz	N		70		
			P		175		
C_{rss}	Reverse Transfer Capacitance	N-Channel Frequency=1.0MHz	N		45		
			P		120		

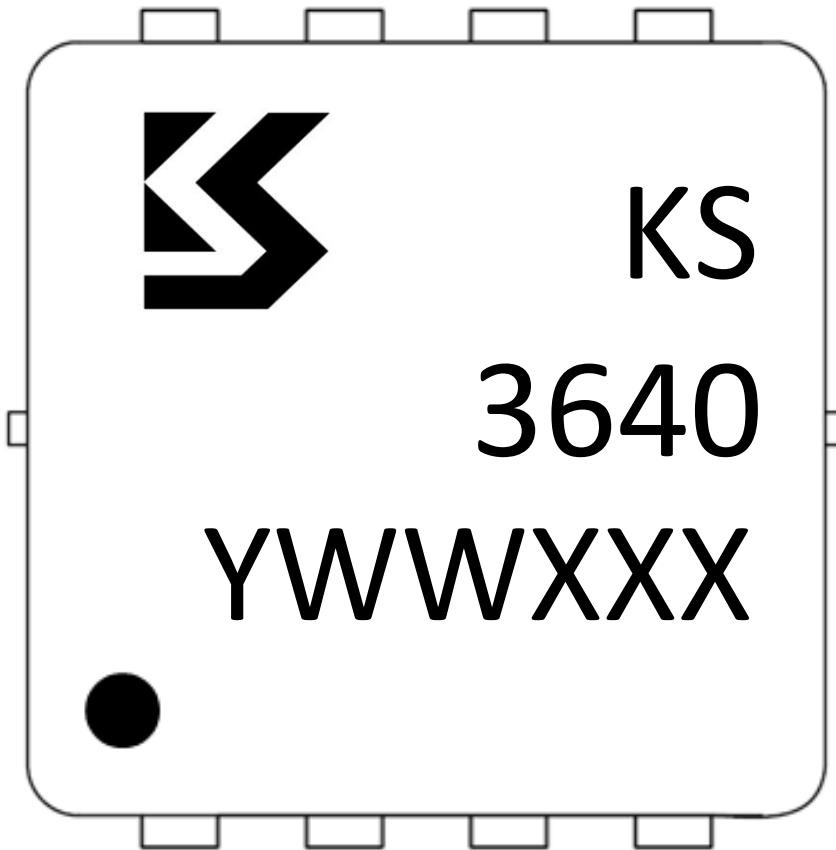
Electrical Characteristics ($T_A=25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Test Condition	KS3640NB			Unit	
			Min.	Typ.	Max.		
Dynamic Characteristics ^⑥							
$t_{d(ON)}$	Turn-on Delay Time	N-Channel $V_{DD}=15\text{V}, I_{DS}=7\text{A},$ $V_{GEN}=10\text{V}, R_G=3\Omega$ P-Channel $V_{DD}=-15\text{V}, I_{DS}=-7\text{A},$ $V_{GEN}=-10\text{V}, R_G=3\Omega$	N		8		ns
			P		13		
t_r	Turn-on Rise Time		N		11		
			P		25		
$t_{d(OFF)}$	Turn-off Delay Time		N		19		
			P		32		
t_f	Turn-off Fall Time		N		9		
			P		14		
Gate Charge Characteristics ^⑥							
Q_g	Total Gate Charge	N-Channel $V_{DS}=15\text{V}, V_{GS}=10\text{V},$ $I_{DS}=7\text{A}$ P-Channel $V_{DS}=-15\text{V}, V_{GS}=-10\text{V},$ $I_{DS}=-7\text{A}$	N		10		nC
			P		23		
Q_{gs}	Gate-Source Charge		N		3		
			P		5		
Q_{gd}	Gate-Drain Charge		N		4		
			P		7		

- Notes:
- ① Pulse width limited by safe operating area.
 - ② Calculated continuous current based on maximum allowable junction temperature.
 - ③ When mounted on 1 inch square copper board, $t \leq 10\text{sec}$. The value in any given application depends on the user's specific board design.
 - ④ Limited by T_{Jmax} . Starting $T_J = 25^\circ\text{C}$, N Channel: $L = 0.5\text{mH}, R_G = 25\Omega, I_{AS} = 6\text{A}, V_{GS} = 10\text{V}$, P-Chanel: $L = 0.5\text{mH}, R_G = 25\Omega, I_{AS} = -9\text{A}, V_{GS} = -10\text{V}$, Part not recommended for use above this value.
 - ⑤ Pulse test; Pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
 - ⑥ Guaranteed by design, not subject to production testing.

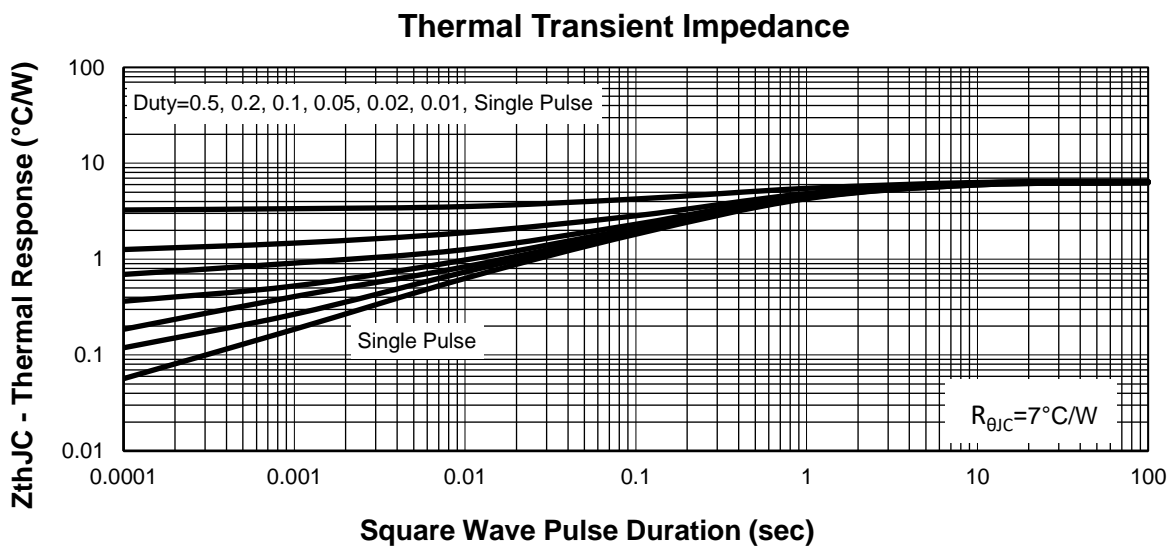
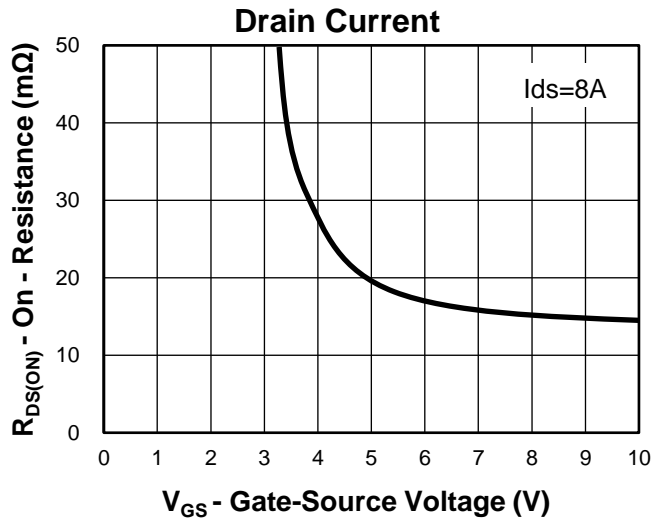
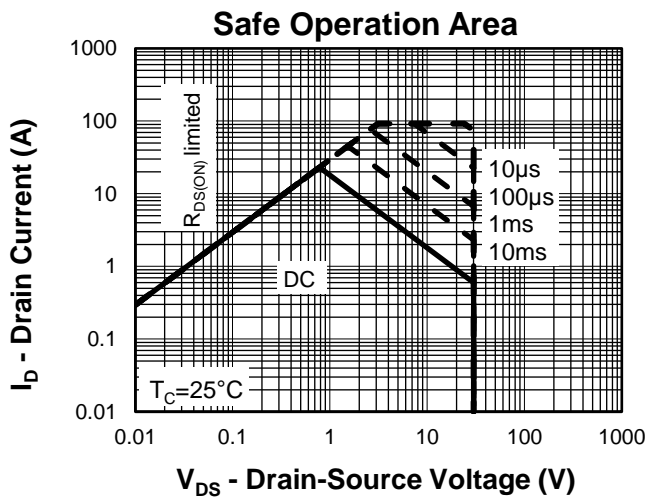
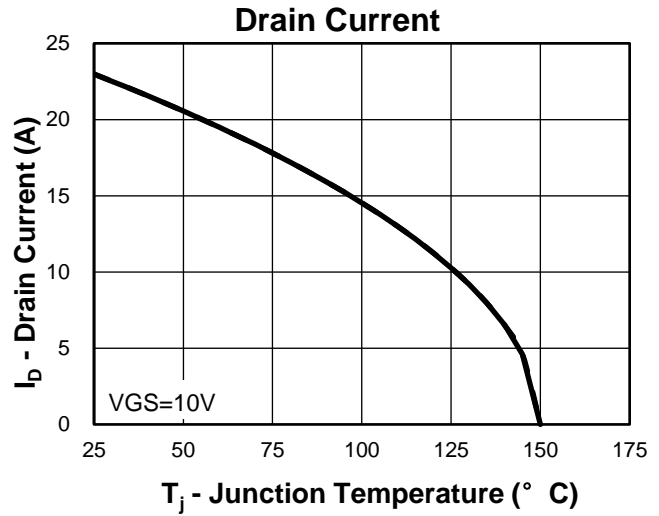
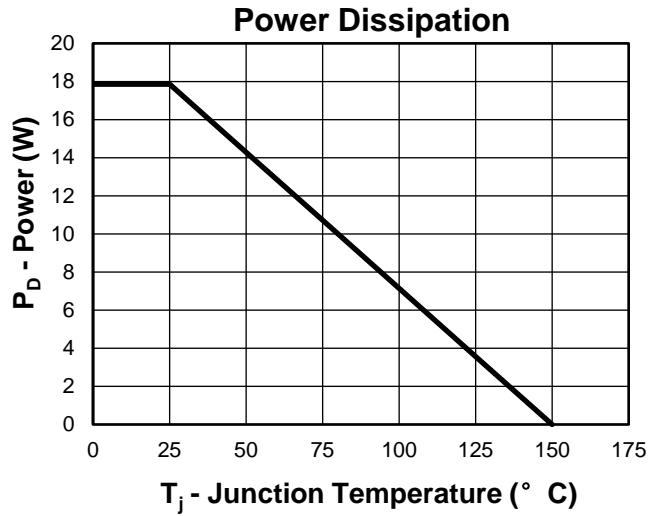
Ordering and Marking Information

Device	Package	Packaging	Quantity	Reel Size	Tape width
KS3640NB	PDFN5060 DP1	Tape&Reel	5000	13"	12mm

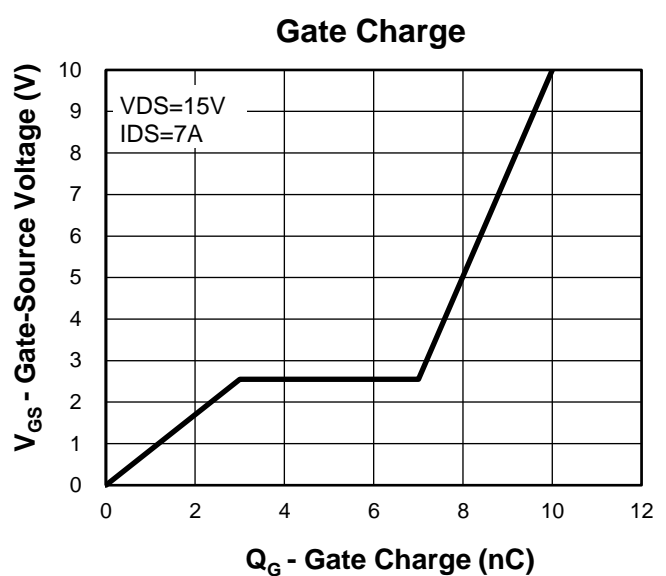
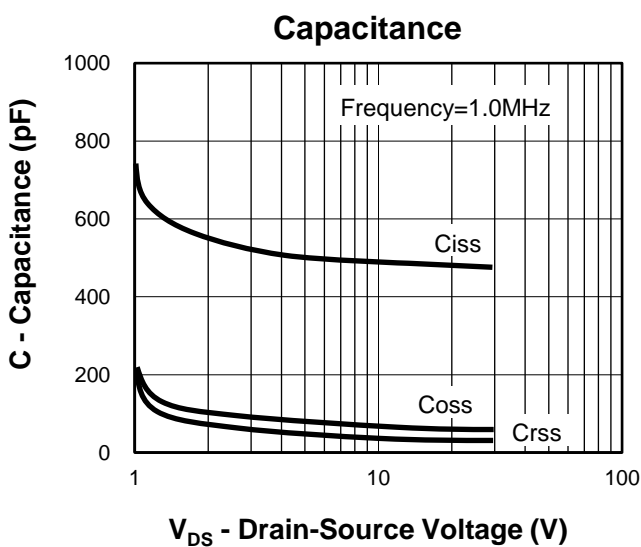
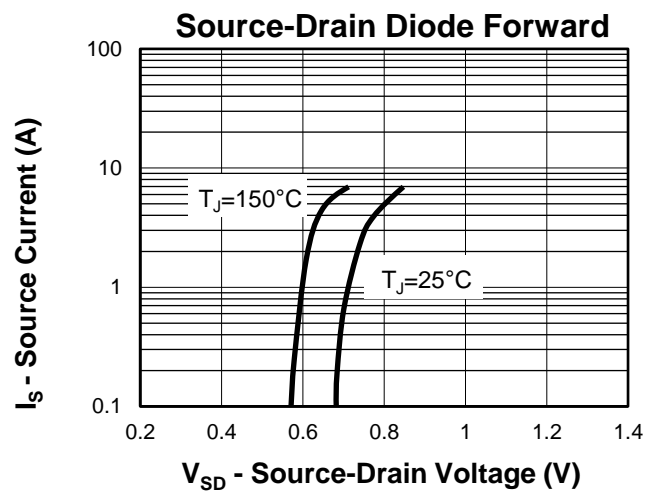
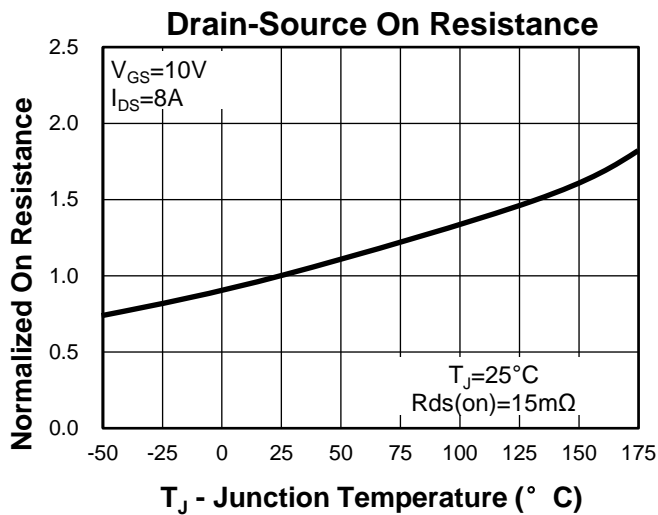
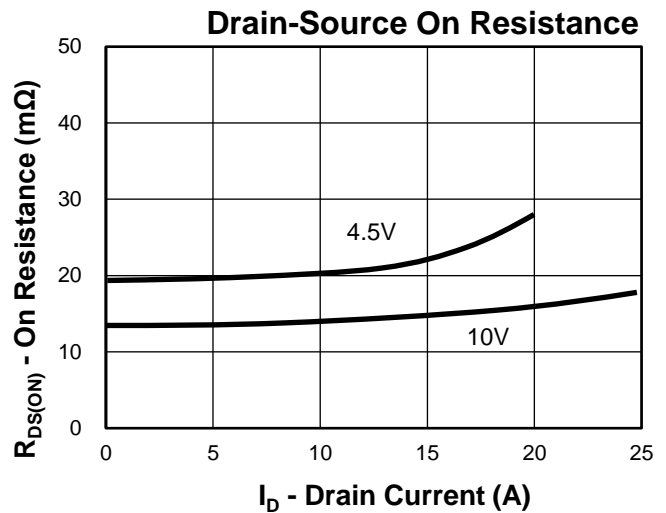
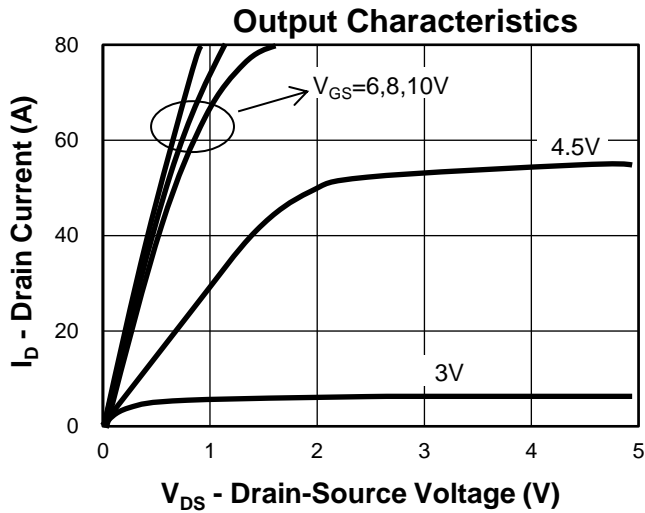


Y =Year,2017-A,2018-B,etc.
WW =Week.
XXX =Lot number.

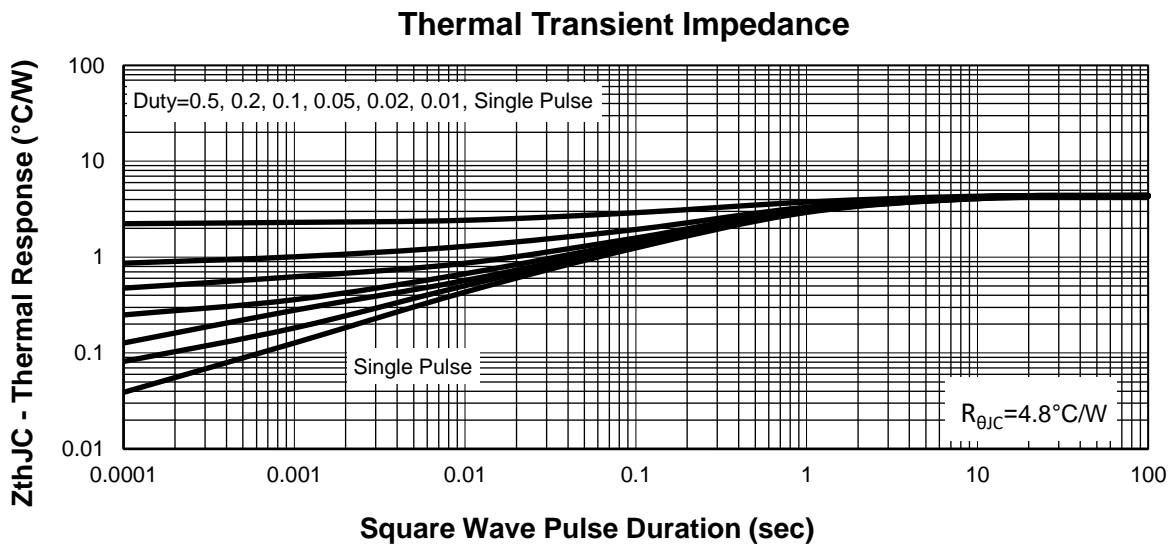
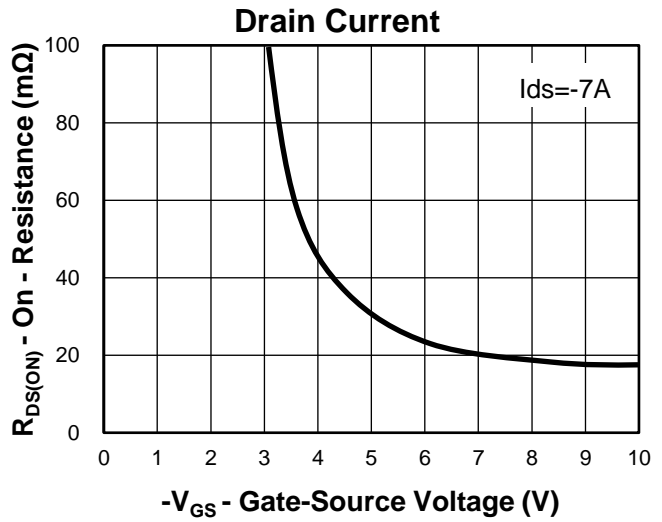
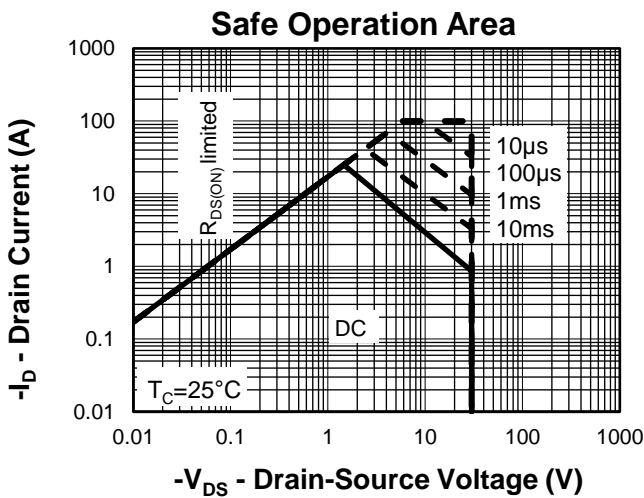
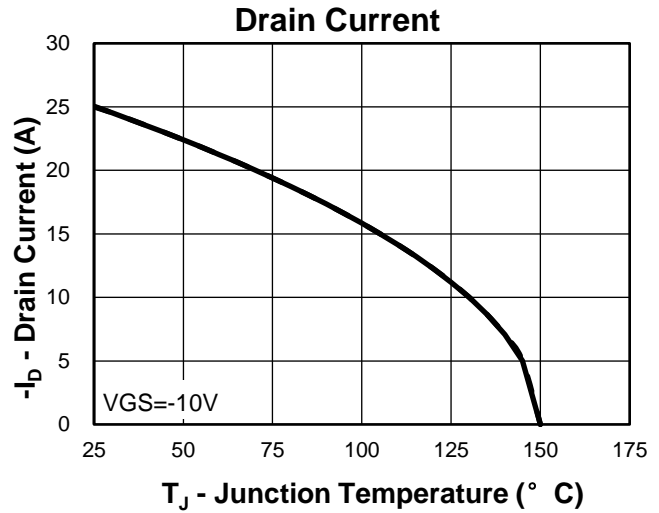
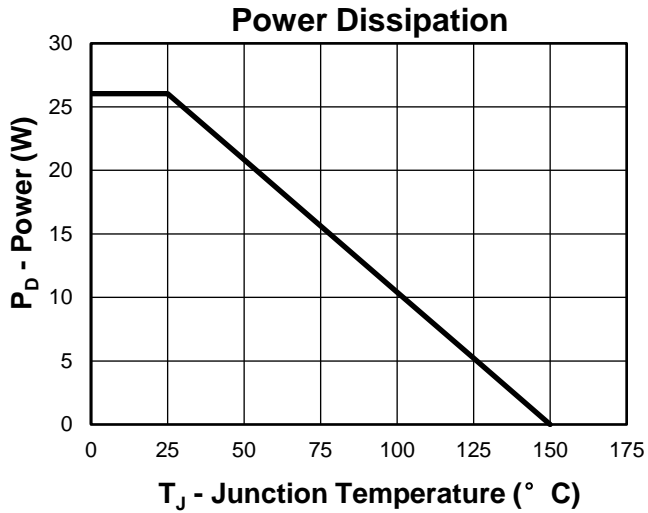
Typical Characteristics(N-Channel)



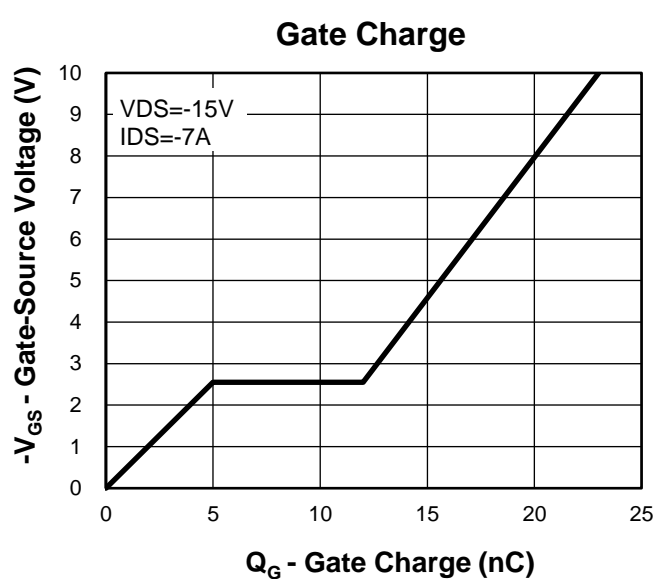
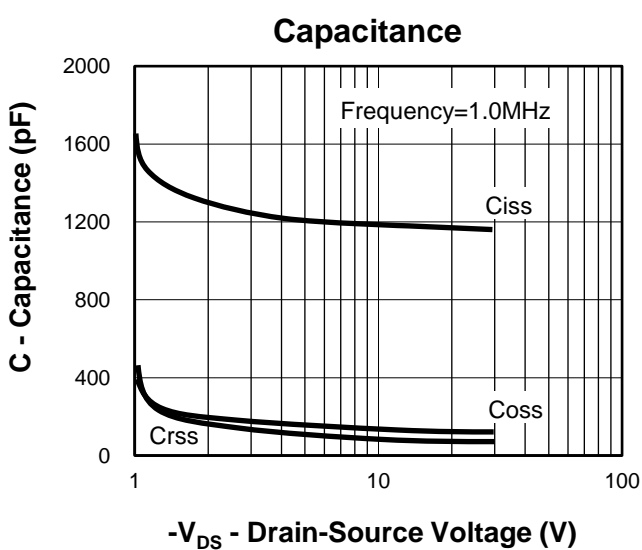
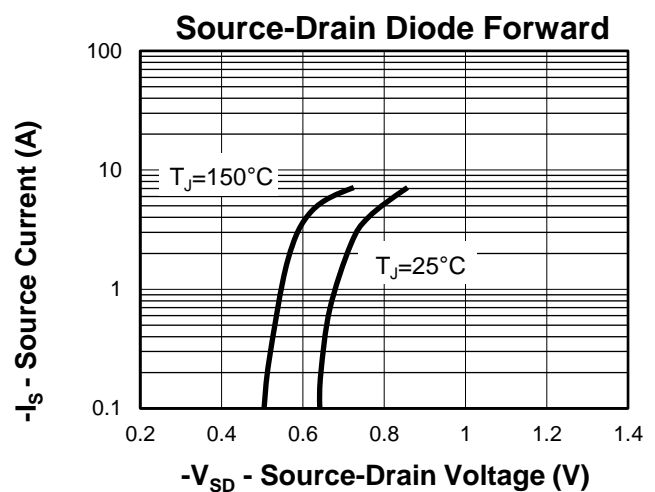
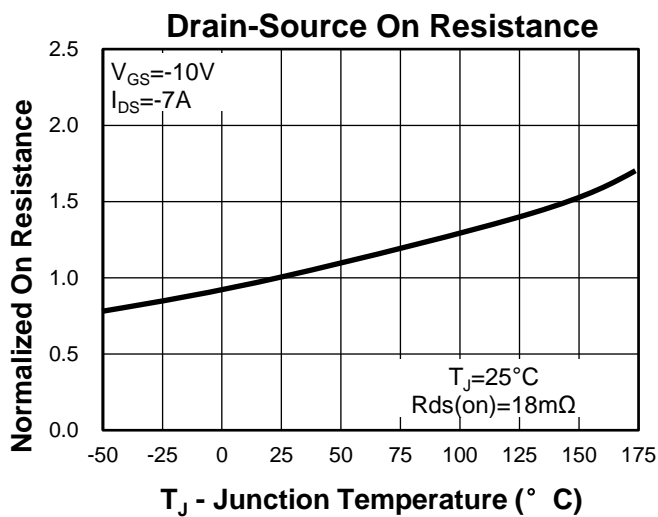
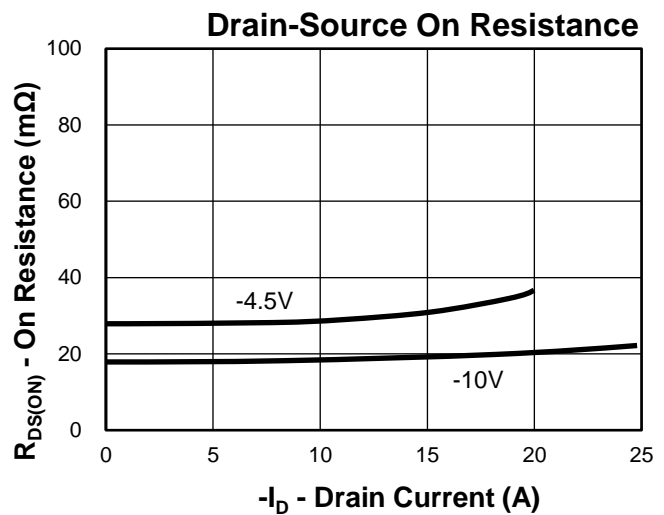
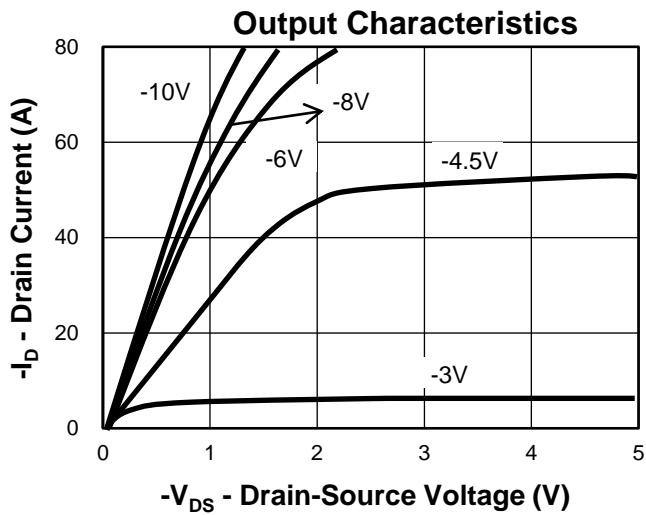
Typical Characteristics(N-Channel)

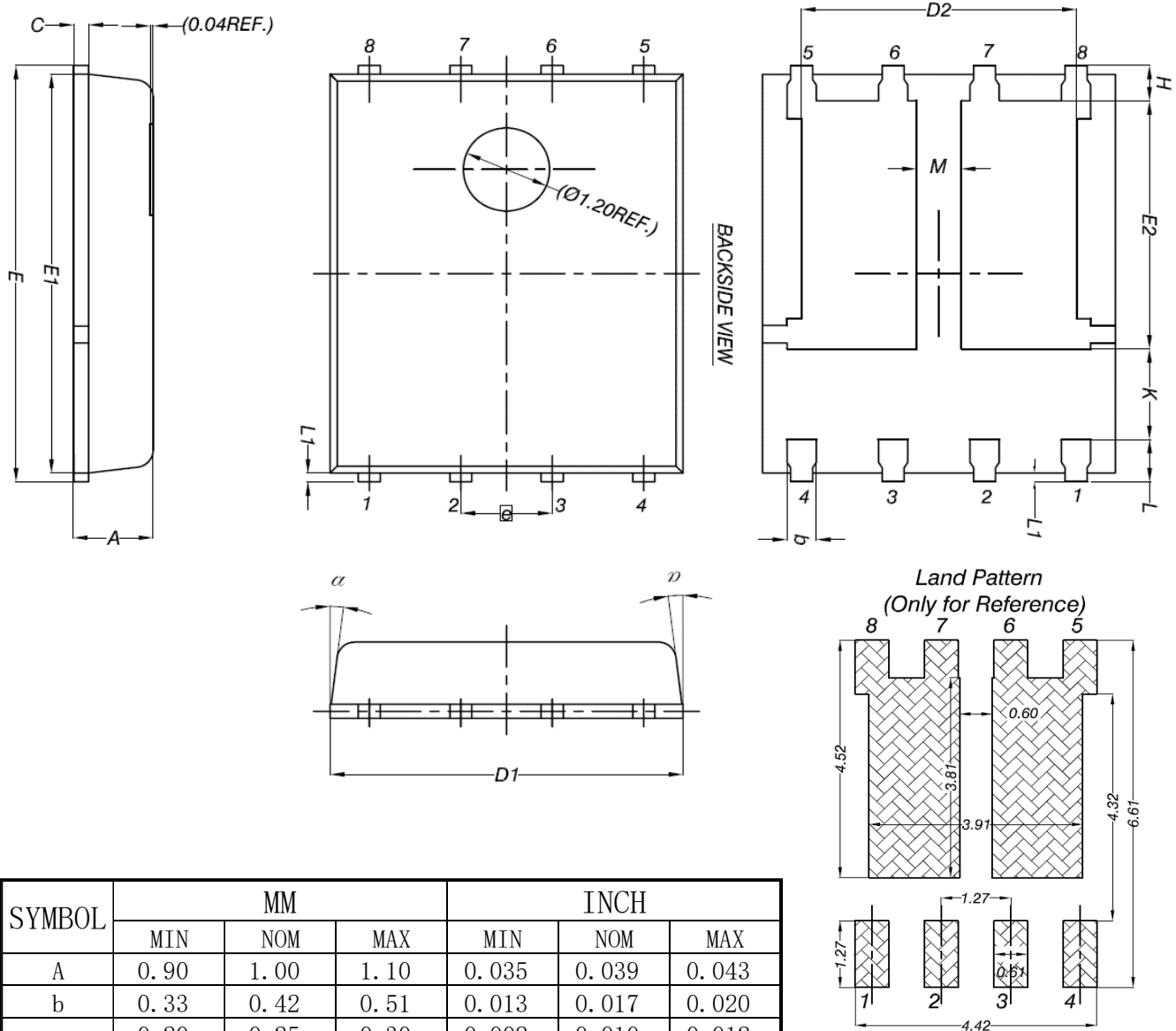


Typical Characteristics(P-Channel)



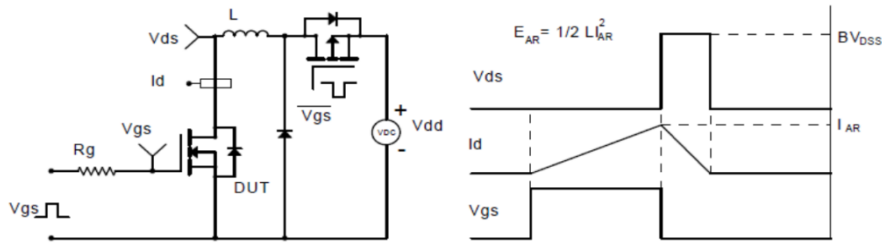
Typical Characteristics(P-Channel)



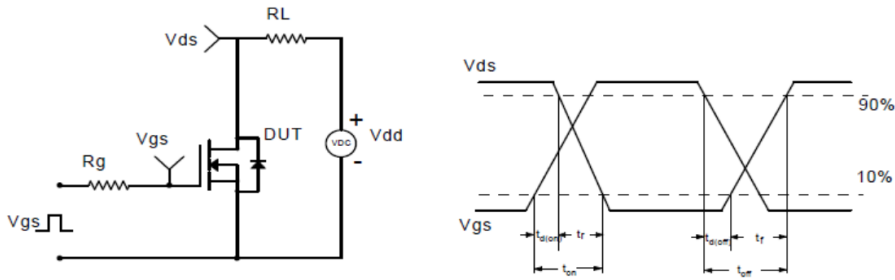
Package Information
PDFN5060 DP1


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
M	0.50			0.020		
a	0°		12°	0°		12°

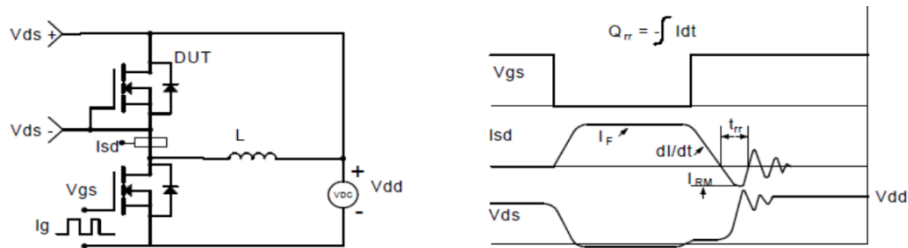
Avalanche Test Circuit and Waveforms(N-Channel)



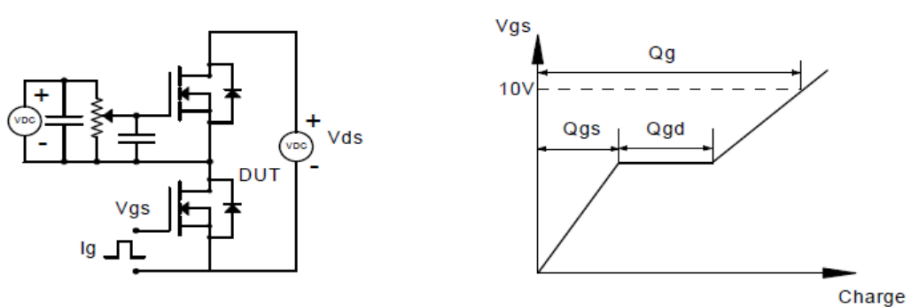
Switching Time Test Circuit and Waveforms(N-Channel)

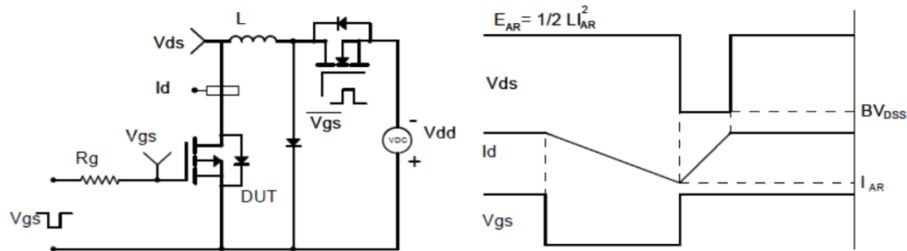
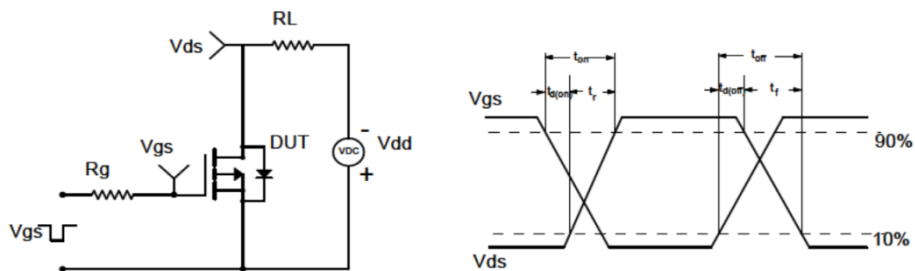
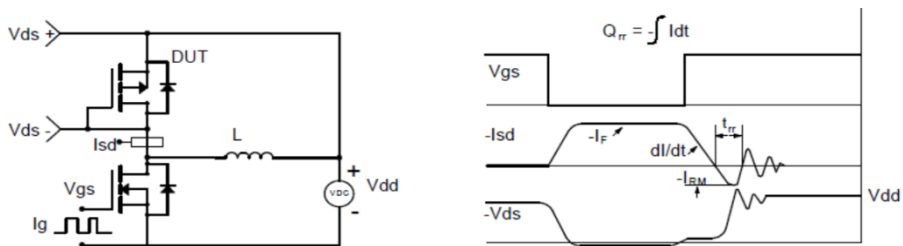
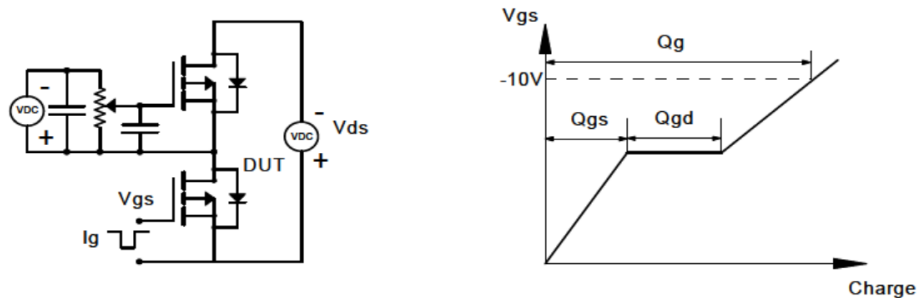


Diode Recovery Test Circuit and Waveforms(N-Channel)



Gate Charge Test Circuit and Waveform(N-Channel)



Avalanche Test Circuit and Waveforms(P-Channel)

Switching Time Test Circuit and Waveforms(P-Channel)

Diode Recovery Test Circuit and Waveforms(P-Channel)

Gate Charge Test Circuit and Waveform(P-Channel)

Customer Service

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