

### Features

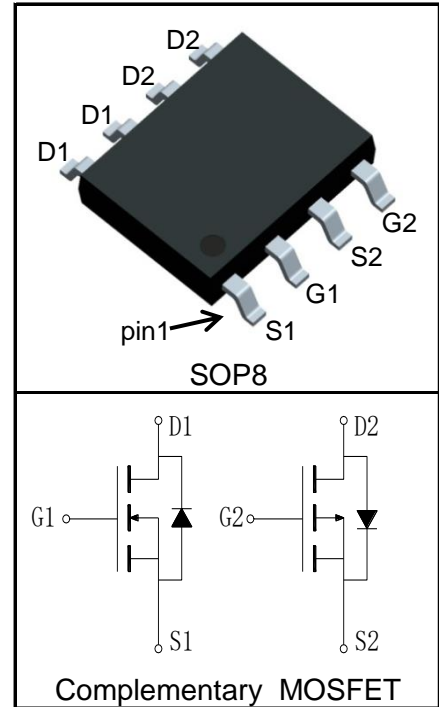
- N-Channel  
60V/4A,  
 $R_{DS(ON)} = 60m\Omega (Typ.) @ V_{GS}=10V$   
 $R_{DS(ON)} = 70m\Omega (Typ.) @ V_{GS}=4.5V$
- P-Channel  
-60V/-4A,  
 $R_{DS(ON)} = 50m\Omega (Typ.) @ V_{GS}=-10V$   
 $R_{DS(ON)} = 65m\Omega (Typ.) @ V_{GS}=-4.5V$
- Super High Dense Cell Design
- Fast Switching

### Applications

- Load Switch



### Pin Description



### Absolute Maximum Ratings

Symbol	Parameter	N-Channel	P-Channel	Unit	
<b>Common Ratings</b> ( $T_A=25^\circ C$ Unless Otherwise Noted)					
$V_{DSS}$	Drain-Source Voltage	60	-60	V	
$V_{GSS}$	Gate-Source Voltage	$\pm 20$	$\pm 20$		
$T_J$	Maximum Junction Temperature	150	150	$^\circ C$	
$T_{STG}$	Storage Temperature Range	-55 to 150	-55 to 150	$^\circ C$	
$I_S$	Diode Continuous Forward Current	$T_A=25^\circ C$	1.6	-1.6	A
<b>Mounted on Large Heat Sink</b>					
$I_{DP}^{①}$	300 $\mu s$ Pulse Drain Current Tested	$T_A=25^\circ C$	16	-16	A
$I_D^{②}$	Continuous Drain Current ( $V_{GS}=\pm 10V$ )	$T_A=25^\circ C$	4	-4	A
		$T_A=70^\circ C$	3.2	-3.2	
$P_D$	Maximum Power Dissipation	$T_A=25^\circ C$	2	2	W
		$T_A=70^\circ C$	1.3	1.3	
$R_{\theta JL}$	Thermal Resistance-Junction to Lead		24	24	$^\circ C/W$
$R_{\theta JA}^{③}$	Thermal Resistance-Junction to Ambient		62.5	62.5	$^\circ C/W$
<b>Drain-Source Avalanche Ratings</b>					
$E_{AS}^{④}$	Avalanche Energy, Single Pulsed		12	20	mJ

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

Symbol	Parameter	Test Condition	KS6638HA			Unit	
			Min.	Typ.	Max.		
<b>Static Characteristics</b>							
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	N	60		V	
		$V_{GS}=0V, I_{DS}=-250\mu A$	P	-60			
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=60V, V_{GS}=0V$	N		1	$\mu A$	
		$T_J=125^\circ C$			30		
		$V_{DS}=-60V, V_{GS}=0V$	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	1.6	2.3	V
		$V_{DS}=V_{GS}, I_{DS}=-250\mu A$	P	-1.1	-1.6	-2.3	
$I_{GSS}$	Gate Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	N			$\pm 100$	nA
		$V_{GS}=\pm 20V, V_{DS}=0V$	P			$\pm 100$	
$R_{DS(ON)}^{(5)}$	Drain-Source On-state Resistance	$V_{GS}=10V, I_{DS}=4A$	N		60	80	m $\Omega$
		$V_{GS}=-10V, I_{DS}=-4A$	P		50	80	
		$V_{GS}=4.5V, I_{DS}=3A$	N		70	100	
		$V_{GS}=-4.5V, I_{DS}=-3A$	P		65	110	
<b>Diode Characteristics</b>							
$V_{SD}^{(5)}$	Diode Forward Voltage	$I_{SD}=4A, V_{GS}=0V$	N		0.84	1.2	V
		$I_{SD}=-4A, V_{GS}=0V$	P		-0.84	-1.2	
$t_{rr}$	Reverse Recovery Time	N-Channel $I_{SD}=4A, di_{SD}/dt=100A/\mu s$	N		21		ns
			P		15		
$Q_{rr}$	Reverse Recovery Charge	P-Channel $I_{SD}=-4A, di_{SD}/dt=100A/\mu s$	N		12		nC
			P		9		
<b>Dynamic Characteristics<sup>(6)</sup></b>							
$R_G$	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1MHz$	N		1.2		$\Omega$
			P		4.8		
$C_{iss}$	Input Capacitance	N-Channel $V_{GS}=0V, V_{DS}=30V,$ Frequency=1.0MHz	N		430		pF
			P		1450		
$C_{oss}$	Output Capacitance	P-Channel $V_{GS}=0V, V_{DS}=-30V,$ Frequency=1.0MHz	N		70		
			P		110		
$C_{rss}$	Reverse Transfer Capacitance	N-Channel Frequency=1.0MHz	N		30		
			P		85		

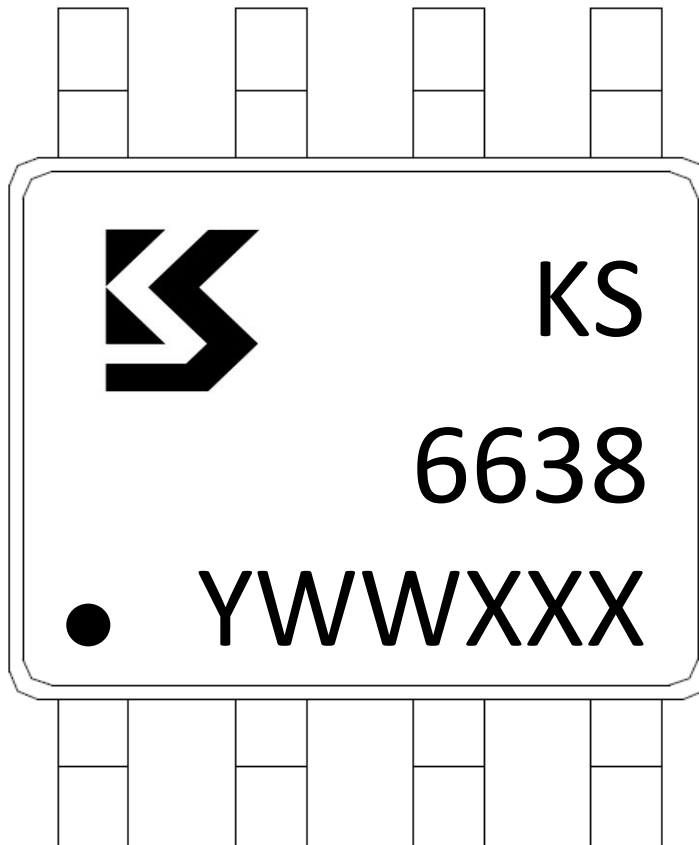
**Electrical Characteristics** ( $T_A=25^\circ\text{C}$  Unless Otherwise Noted)

Symbol	Parameter	Test Condition	KS6638HA			Unit	
			Min.	Typ.	Max.		
<b>Dynamic Characteristics</b> <sup>⑥</sup>							
$t_{d(ON)}$	Turn-on Delay Time	N-Channel $V_{DD}=30\text{V}$ , $I_{DS}=4\text{A}$ , $V_{GEN}=10\text{V}$ , $R_G=3\Omega$  P-Channel $V_{DD}=-30\text{V}$ , $I_{DS}=-4\text{A}$ , $V_{GEN}=-10\text{V}$ , $R_G=3\Omega$	N		7		ns
			P		8		
$t_r$	Turn-on Rise Time		N		14		
			P		15		
$t_{d(OFF)}$	Turn-off Delay Time		N		27		
			P		39		
$t_f$	Turn-off Fall Time		N		11		
			P		26		
<b>Gate Charge Characteristics</b> <sup>⑥</sup>							
$Q_g$	Total Gate Charge	N-Channel $V_{DS}=30\text{V}$ , $V_{GS}=10\text{V}$ , $I_{DS}=4\text{A}$  P-Channel $V_{DS}=-30\text{V}$ , $V_{GS}=-10\text{V}$ , $I_{DS}=-4\text{A}$	N		14		nC
			P		20		
$Q_{gs}$	Gate-Source Charge		N		3.1		
			P		4.3		
$Q_{gd}$	Gate-Drain Charge		N		3.8		
			P		5.5		

- 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:  $L = 0.5\text{mH}$ ,  $R_G = 25\Omega$ ,  $I_{AS} = 7\text{A}$ ,  $V_{GS} = 10\text{V}$ , P-Channel:  $L = 0.5\text{mH}$ ,  $R_G = 25\Omega$ ,  $I_{AS} = -9\text{A}$ ,  $V_{GS} = -10\text{V}$ , 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
KS6638HA	SOP8	Tape&Reel	3000	13"	12mm

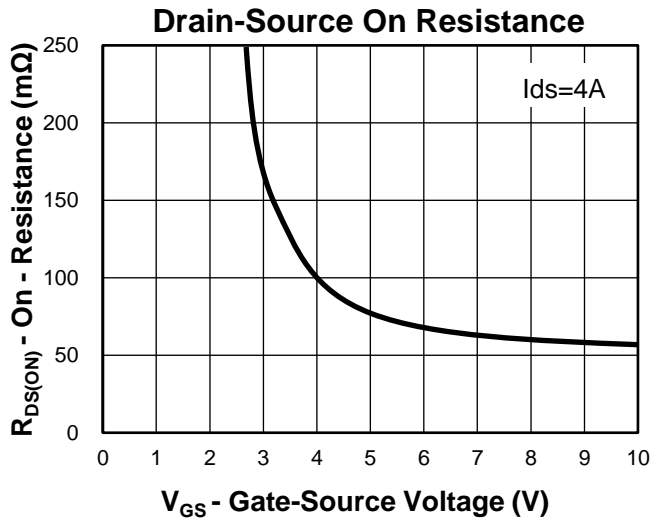
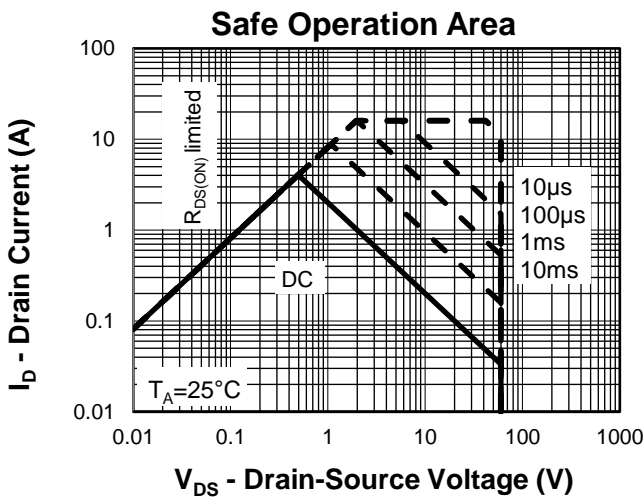
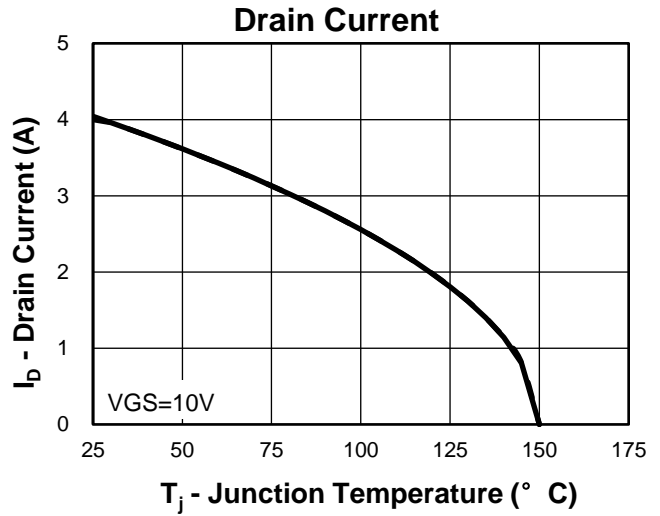
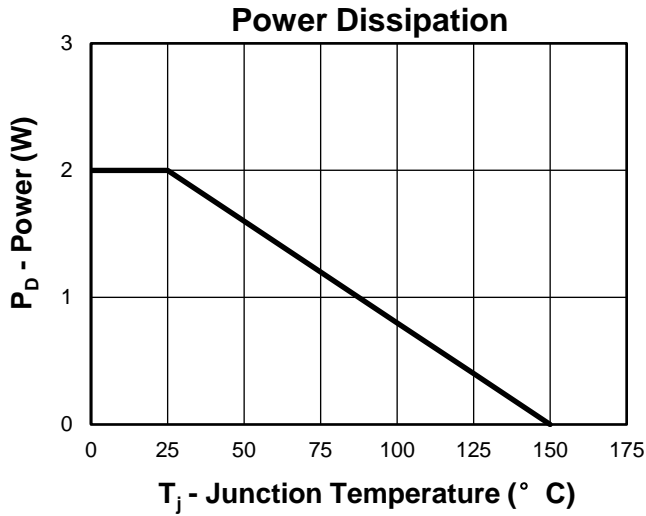


1st Line: Kwansemi LOGO, Kwansemi Code(KS)

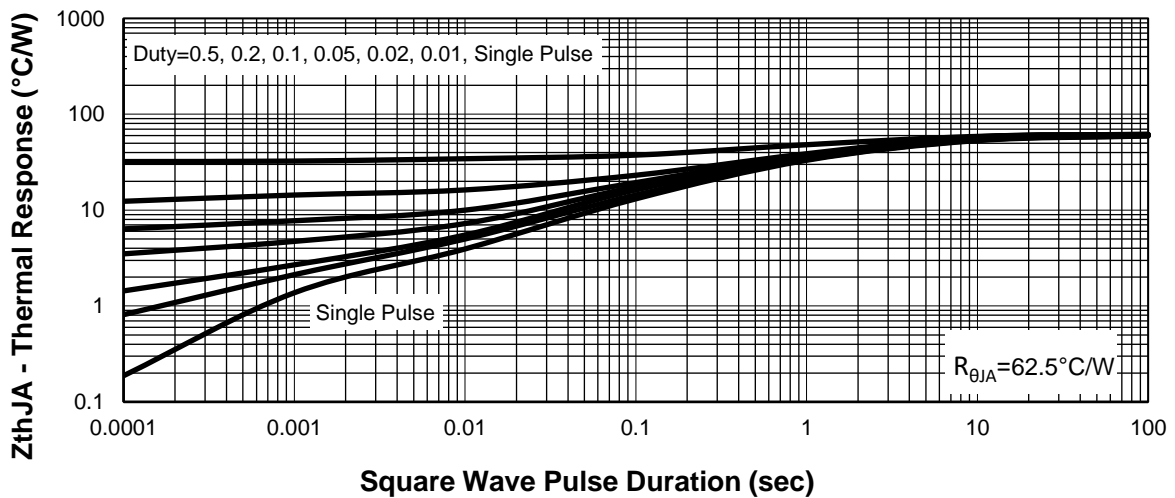
2nd Line: Part Number(6638)

3rd Line: Lot Number(YWWXXX)

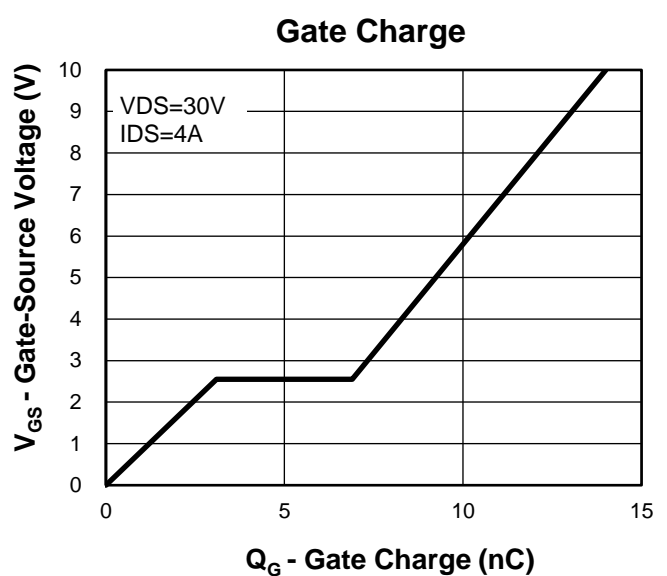
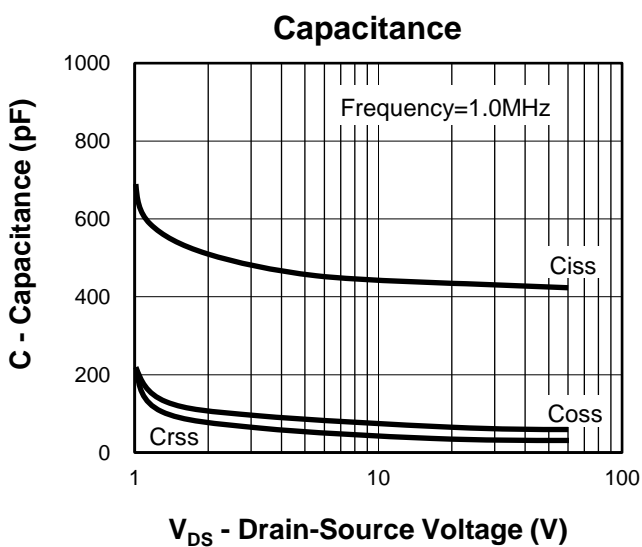
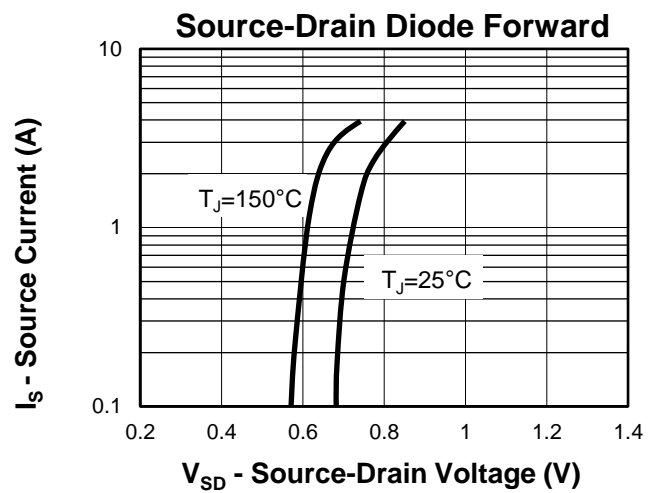
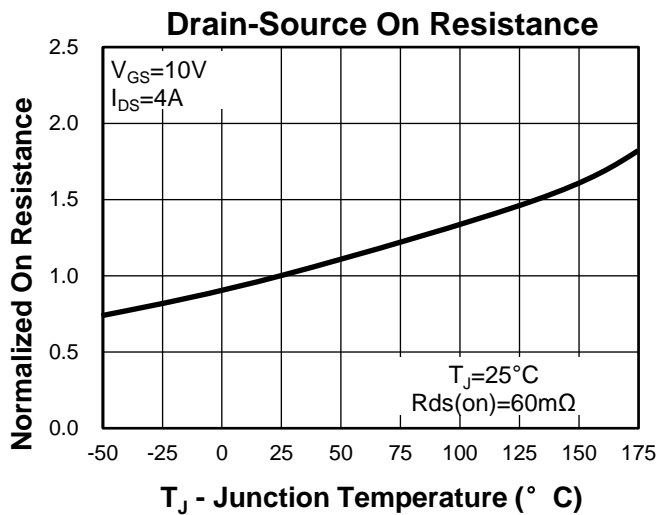
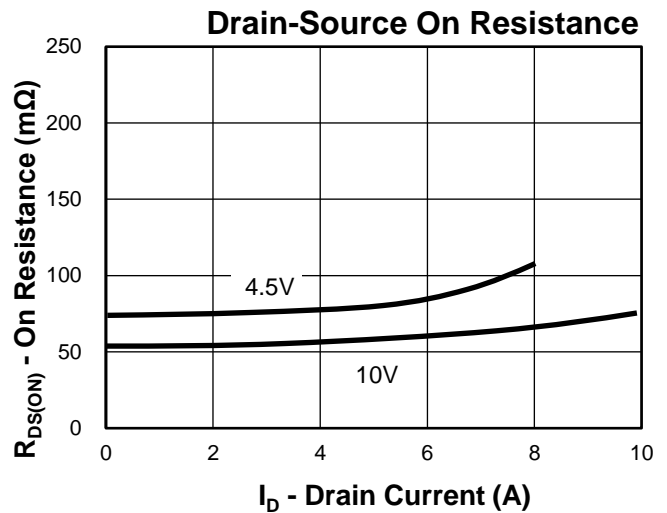
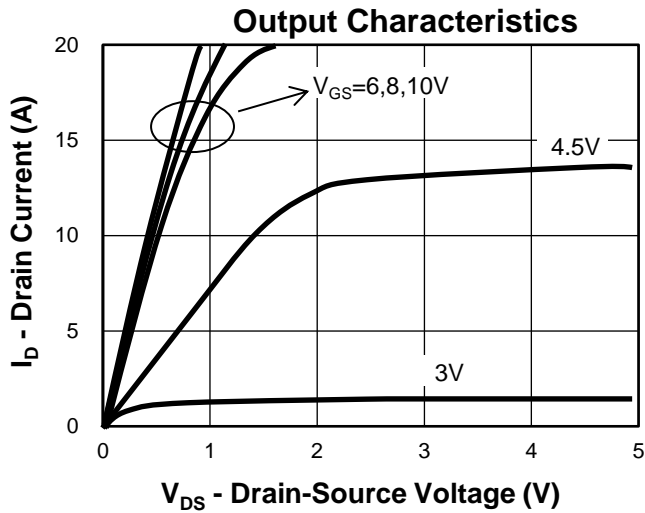
Typical Characteristics(N-Channel)



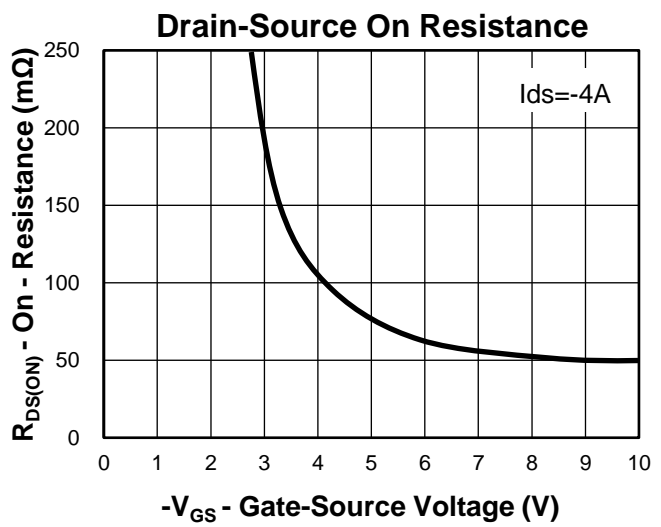
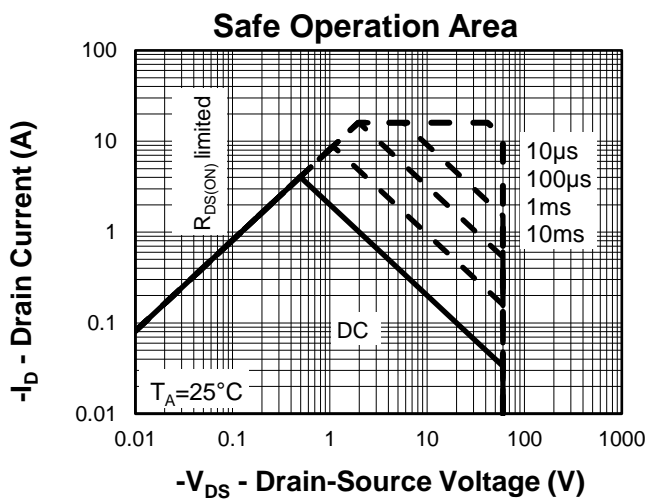
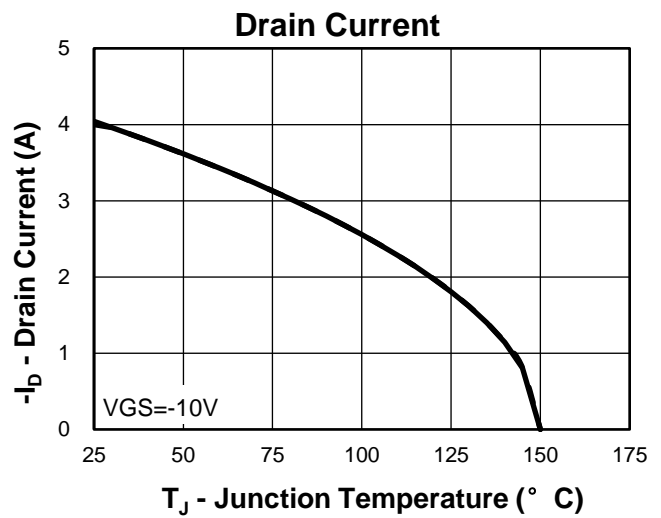
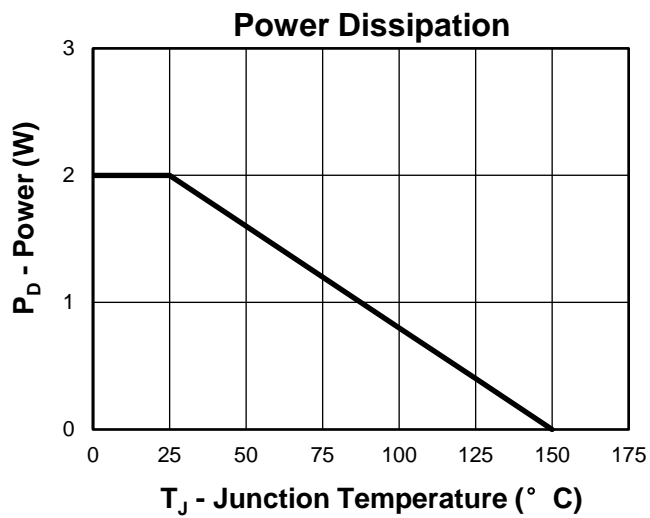
Thermal Transient Impedance



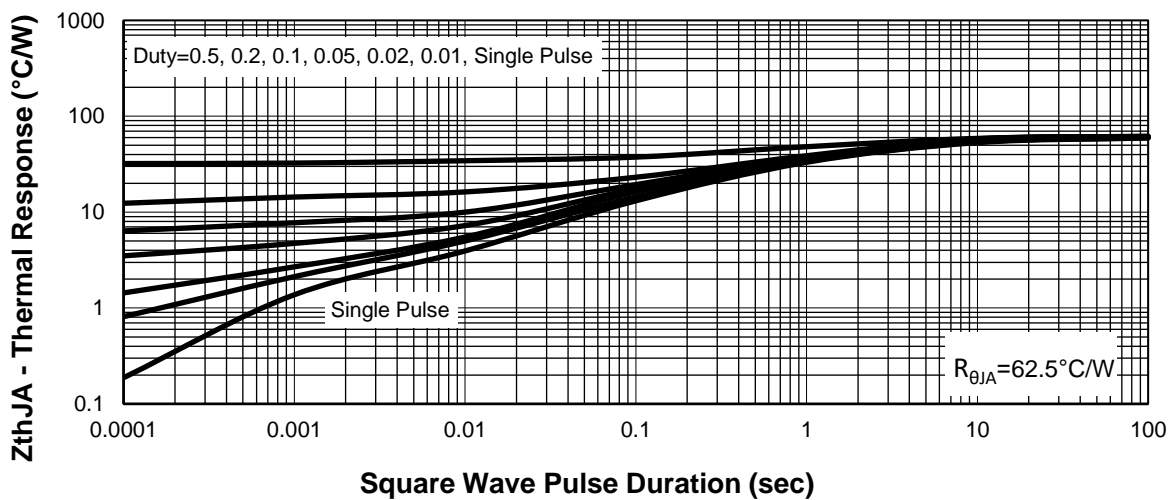
Typical Characteristics(N-Channel)



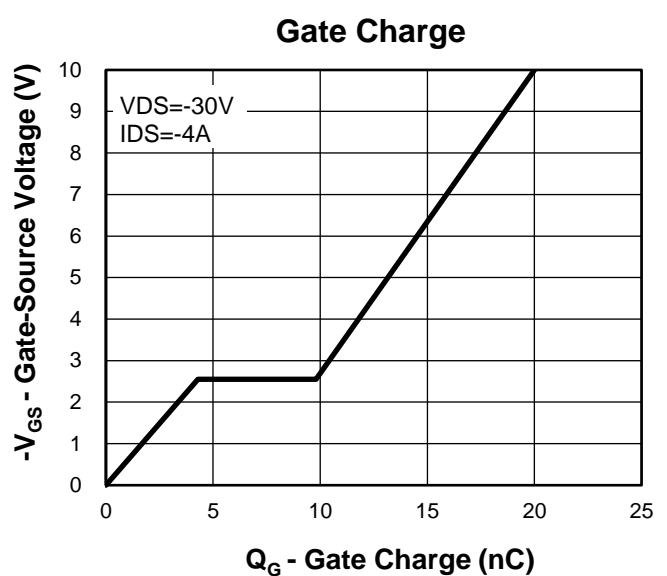
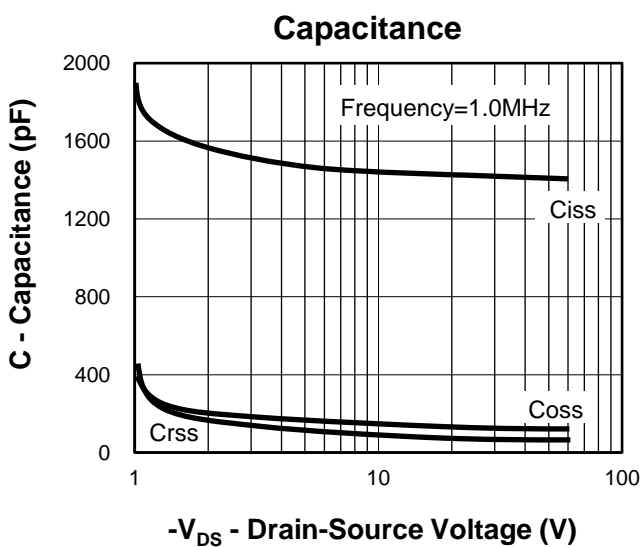
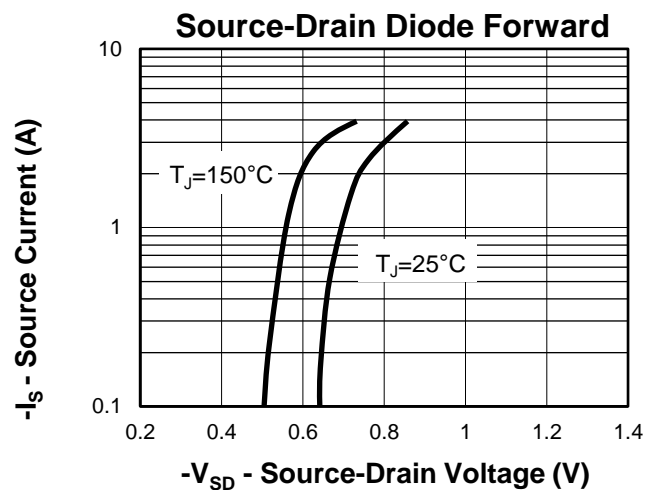
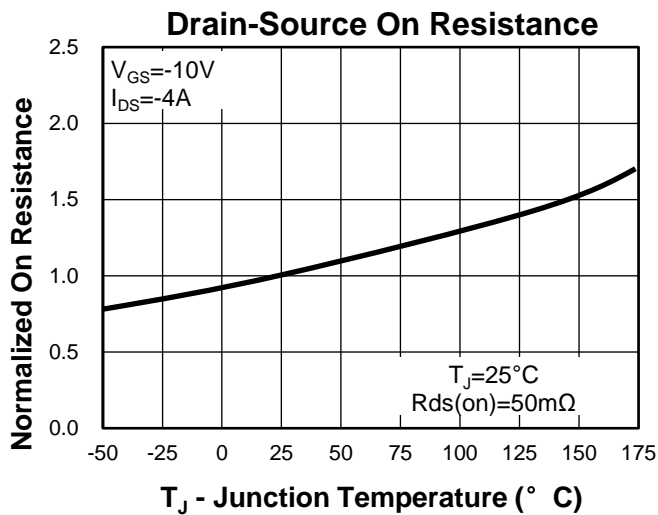
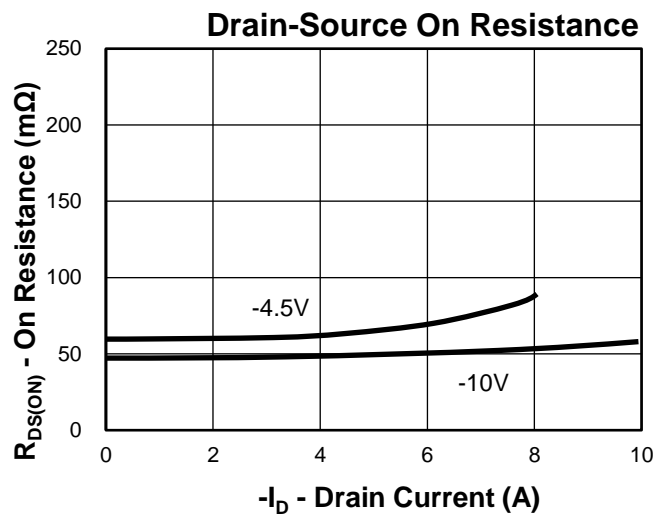
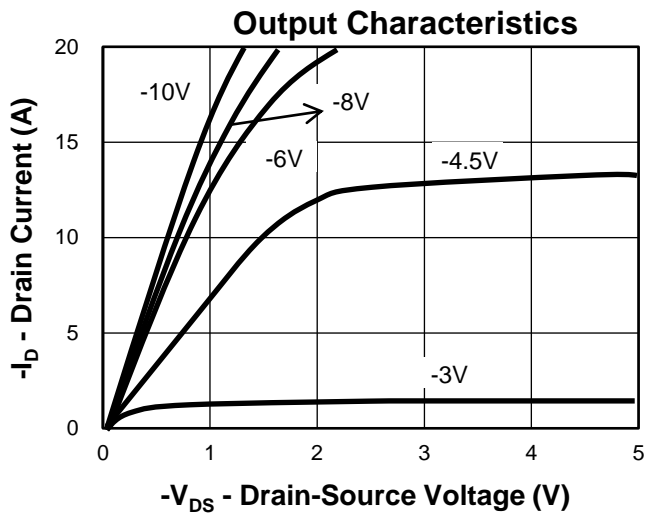
### Typical Characteristics(P-Channel)



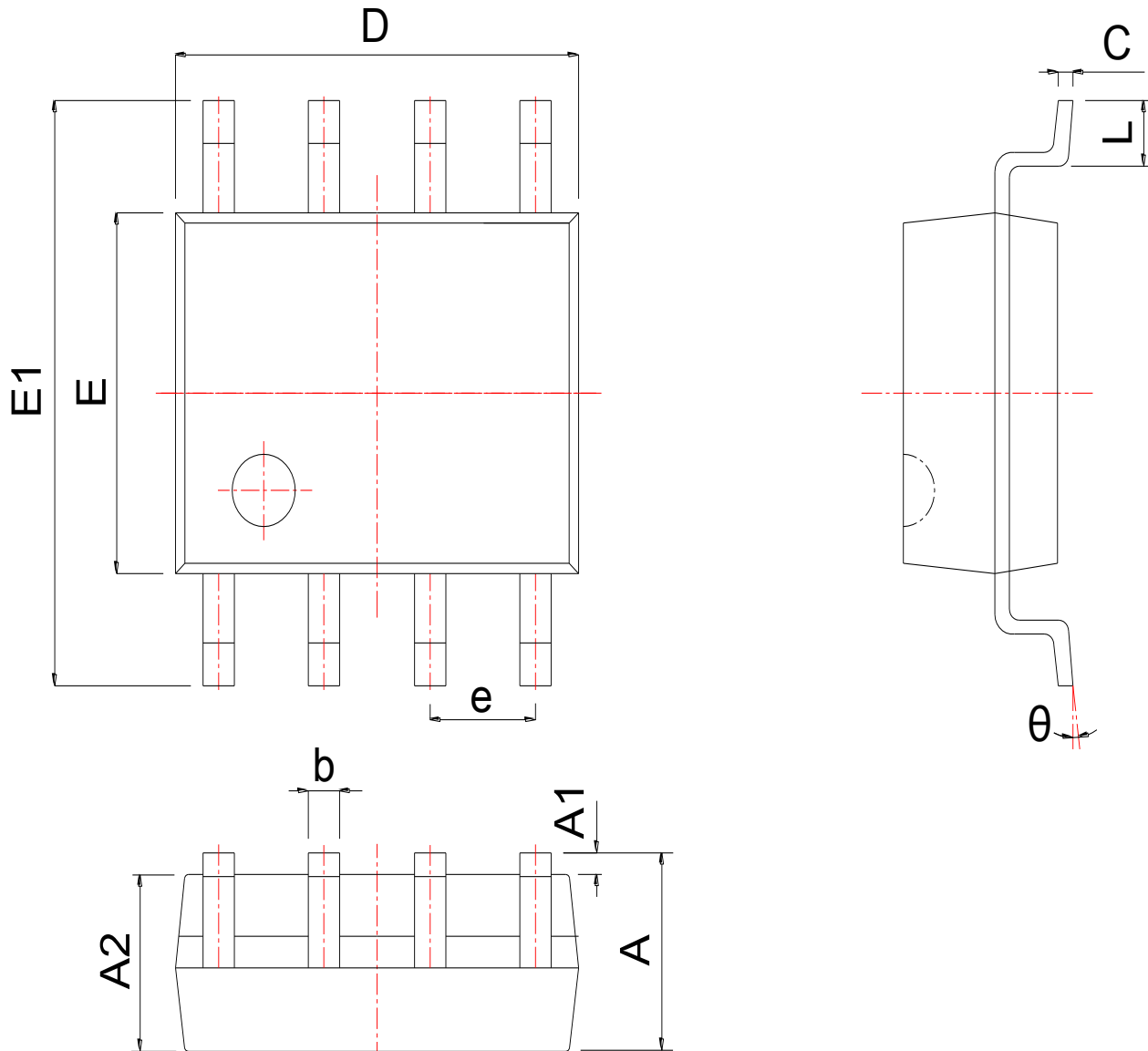
### Thermal Transient Impedance



Typical Characteristics(P-Channel)

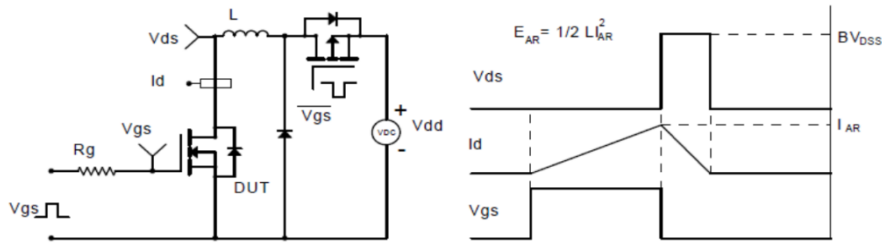




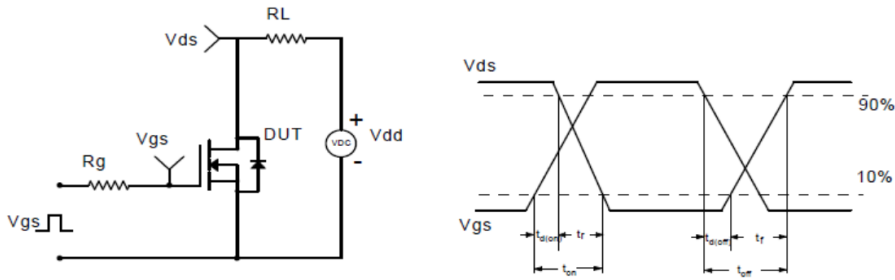
**Package Information**
**SOP8**


SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.300	1.525	1.750	0.051	0.060	0.069
A1	0.050	0.150	0.250	0.002	0.006	0.010
A2	1.350	1.450	1.550	0.053	0.057	0.061
b	0.330	0.420	0.510	0.013	0.017	0.020
c	0.170	0.210	0.250	0.007	0.008	0.010
D	4.700	4.900	5.100	0.185	0.193	0.201
E	3.800	3.900	4.000	0.150	0.154	0.157
E1	5.800	6.000	6.200	0.228	0.236	0.244
e	1.270 BSC			0.050 BSC		
L	0.400	0.835	1.270	0.016	0.033	0.050
θ	0°		8°	0°		8°

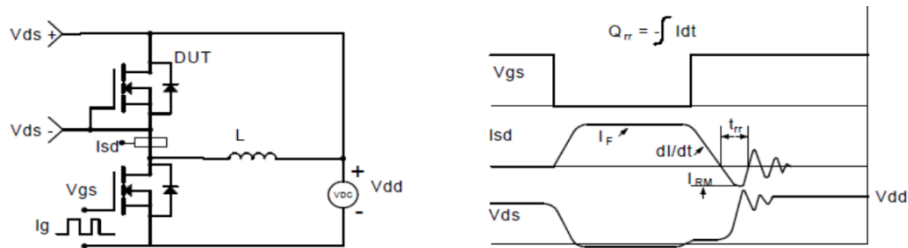
**Avalanche Test Circuit and Waveforms(N-Channel)**



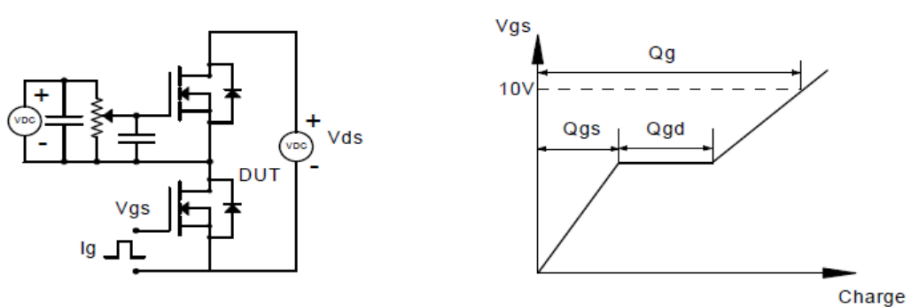
**Switching Time Test Circuit and Waveforms(N-Channel)**

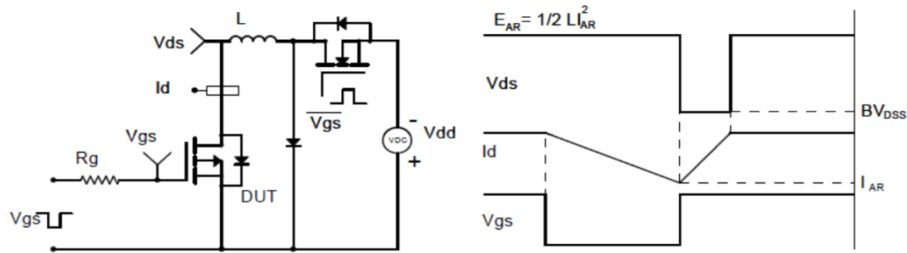
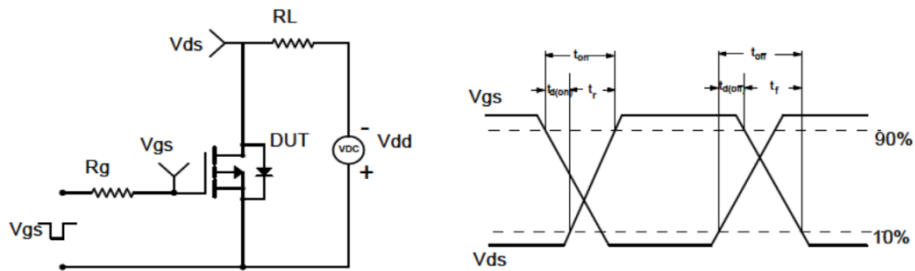
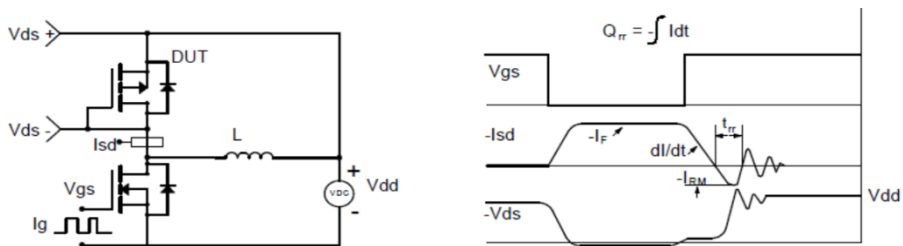
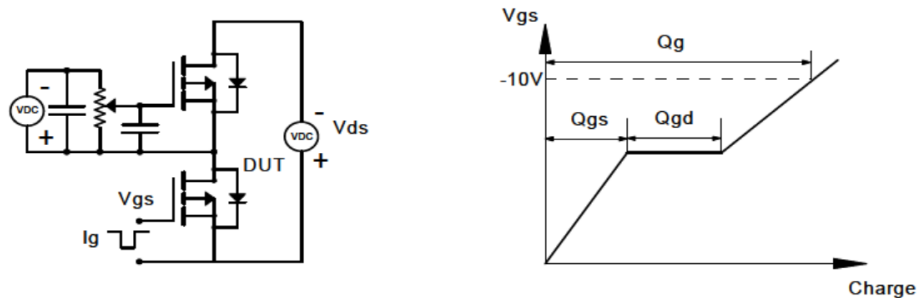


**Diode Recovery Test Circuit and Waveforms(N-Channel)**



**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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