

Features

- N-Channel
40V/6A,
 $R_{DS(ON)} = 25m\Omega$ (Typ.) @ $V_{GS} = 10V$
 $R_{DS(ON)} = 32m\Omega$ (Typ.) @ $V_{GS} = 4.5V$
- P-Channel
-40V/-4.6A,
 $R_{DS(ON)} = 60m\Omega$ (Typ.) @ $V_{GS} = -10V$
 $R_{DS(ON)} = 85m\Omega$ (Typ.) @ $V_{GS} = -4.5V$
- Very low on-resistance
- Fast Switching

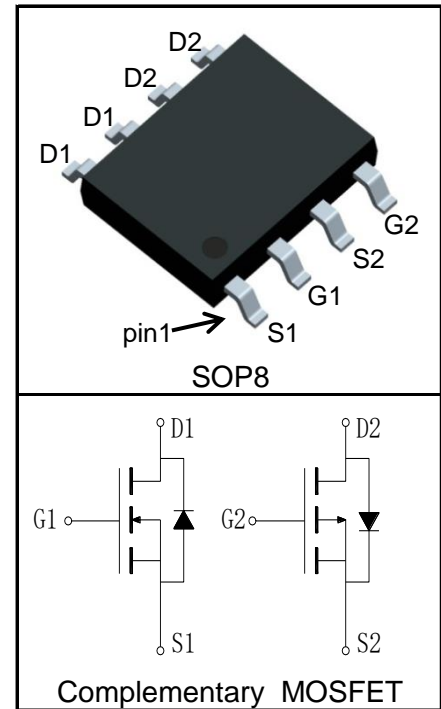
Applications

- Load Switch



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	40	-40	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	$T_A = 25^\circ\text{C}$	1.6	-1.6	A
Mounted on Large Heat Sink					
$I_{DP}^{①}$	300 μs Pulse Drain Current Tested	$T_A = 25^\circ\text{C}$	24	-18	A
$I_D^{②}$	Continuous Drain Current ($V_{GS} = \pm 10V$)	$T_A = 25^\circ\text{C}$	6	-4.6	A
		$T_A = 70^\circ\text{C}$	4.8	-3.7	
P_D	Maximum Power Dissipation	$T_A = 25^\circ\text{C}$	2	2	W
		$T_A = 70^\circ\text{C}$	1.3	1.3	
$R_{\theta JL}$	Thermal Resistance-Junction to Lead		24	24	$^\circ\text{C/W}$
$R_{\theta JA}^{③}$	Thermal Resistance-Junction to Ambient		62.5	62.5	$^\circ\text{C/W}$
Drain-Source Avalanche Ratings					
$E_{AS}^{④}$	Avalanche Energy, Single Pulsed		9	9	mJ

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

Symbol	Parameter	Test Condition	KS4640HA			Unit	
			Min.	Typ.	Max.		
Static Characteristics							
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	N	40		V	
		$V_{GS}=0V, I_{DS}=-250\mu A$	P	-40			
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=40V, V_{GS}=0V$	N		1	μA	
		$T_J=125^\circ C$			30		
		$V_{DS}=-40V, V_{GS}=0V$	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	1.5	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	$V_{GS}=10V, I_{DS}=4A$	N		25	30	m Ω
		$V_{GS}=-10V, I_{DS}=-3A$	P		60	70	
		$V_{GS}=4.5V, I_{DS}=3A$	N		32	40	
		$V_{GS}=-4.5V, I_{DS}=-2A$	P		85	100	
Diode Characteristics							
$V_{SD}^{(5)}$	Diode Forward Voltage	$I_{SD}=4A, V_{GS}=0V$	N		0.81	1.2	V
		$I_{SD}=-3A, V_{GS}=0V$	P		-0.86	-1.2	
t_{rr}	Reverse Recovery Time	N-Channel $I_{SD}=4A, di_{SD}/dt=100A/\mu s$	N		12		ns
			P		13		
Q_{rr}	Reverse Recovery Charge	P-Channel $I_{SD}=-3A, di_{SD}/dt=100A/\mu s$	N		8		nC
			P		9		
Dynamic Characteristics⁽⁶⁾							
R_G	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1MHz$	N		1.6		Ω
			P		5.3		
C_{iss}	Input Capacitance	N-Channel $V_{GS}=0V, V_{DS}=20V,$ Frequency=1.0MHz	N		850		pF
			P		1050		
C_{oss}	Output Capacitance	P-Channel $V_{GS}=0V, V_{DS}=-20V,$ Frequency=1.0MHz	N		125		
			P		140		
C_{rss}	Reverse Transfer Capacitance	N-Channel $V_{GS}=0V, V_{DS}=-20V,$ Frequency=1.0MHz	N		60		
			P		75		

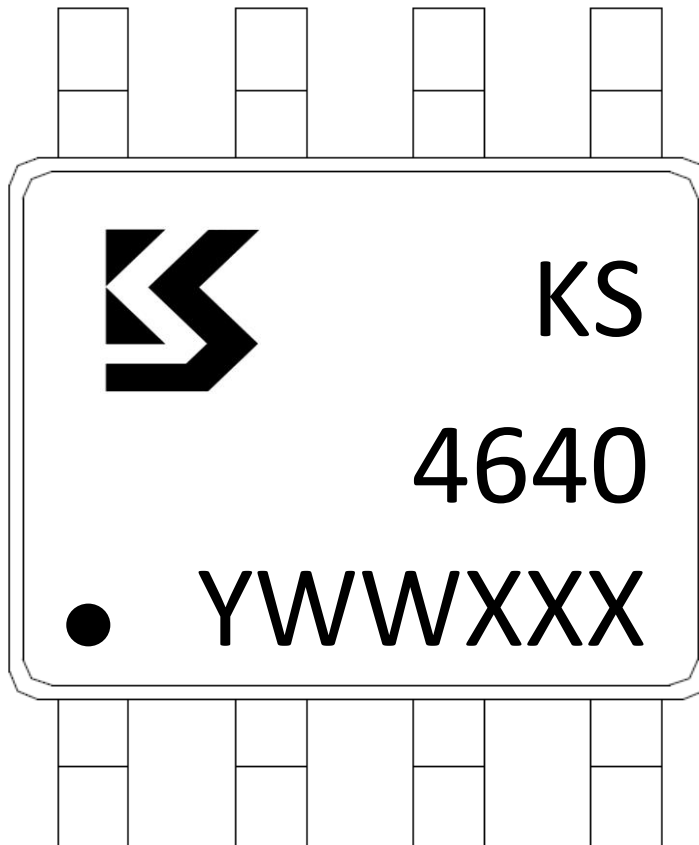
Electrical Characteristics ($T_A=25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Test Condition	KS4640HA			Unit	
			Min.	Typ.	Max.		
Dynamic Characteristics ^⑥							
$t_{d(ON)}$	Turn-on Delay Time	N-Channel $V_{DD}=20\text{V}, I_{DS}=4\text{A},$ $V_{GEN}=10\text{V}, R_G=3\Omega$ P-Channel $V_{DD}=-20\text{V}, I_{DS}=-3\text{A},$ $V_{GEN}= -10\text{V}, R_G=3\Omega$	N		8		ns
			P		15		
t_r	Turn-on Rise Time		N		12		
			P		21		
$t_{d(OFF)}$	Turn-off Delay Time		N		29		
			P		33		
t_f	Turn-off Fall Time		N		10		
			P		18		
Gate Charge Characteristics ^⑥							
Q_g	Total Gate Charge	N-Channel $V_{DS}=20\text{V}, V_{GS}=10\text{V},$ $I_{DS}=4\text{A}$ P-Channel $V_{DS}=-20\text{V}, V_{GS}= -10\text{V},$ $I_{DS}=-3\text{A}$	N		13		nC
			P		18		
Q_{gs}	Gate-Source Charge		N		2.8		
			P		3.2		
Q_{gd}	Gate-Drain Charge		N		3.7		
			P		4.8		

- 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: $L = 0.5\text{mH}, R_G = 25\Omega, I_{AS} = -6\text{A}, V_{GS} = -10\text{V}$, 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
KS4640HA	SOP8	Tape&Reel	3000	13"	12mm

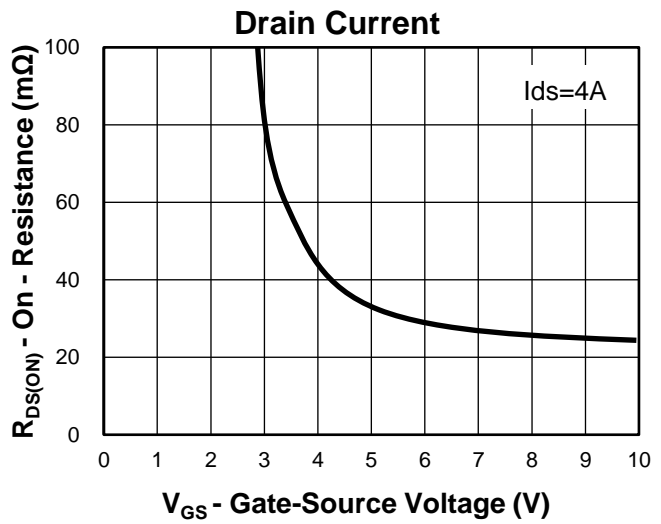
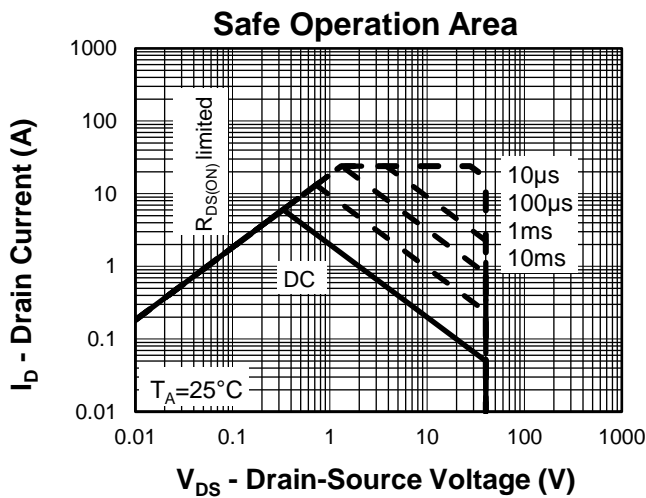
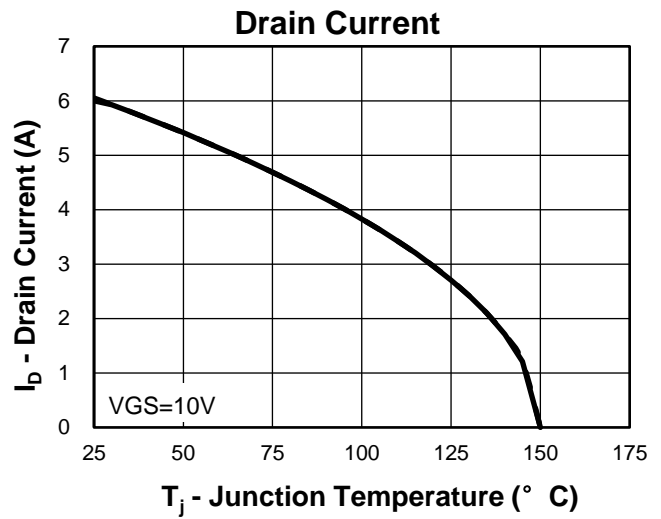
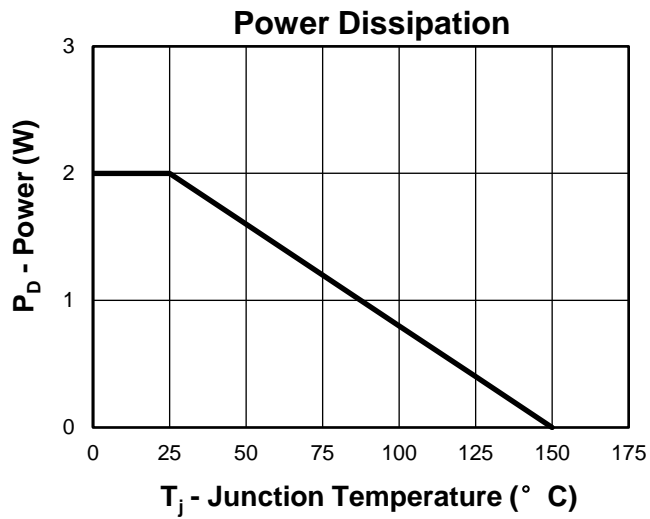


Y =Year,2017-A,2018-B,etc.

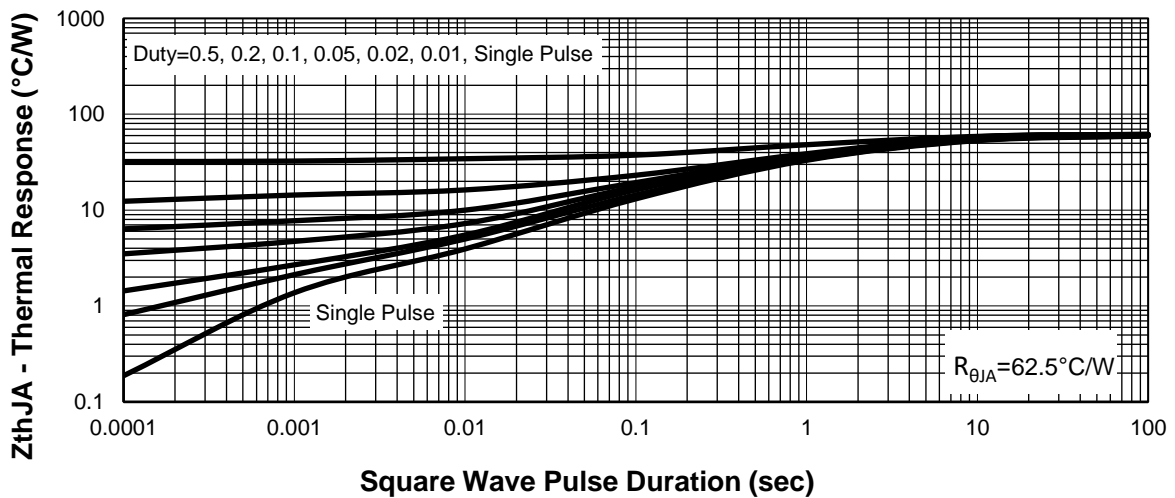
WW =Week.

XXX =Lot number.

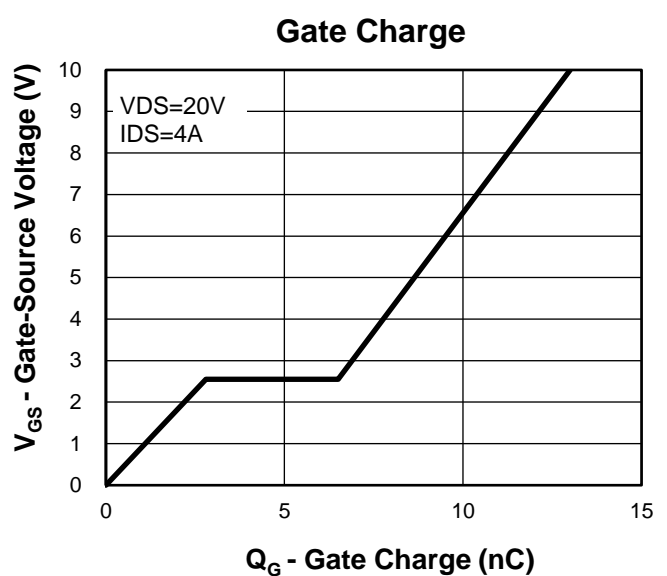
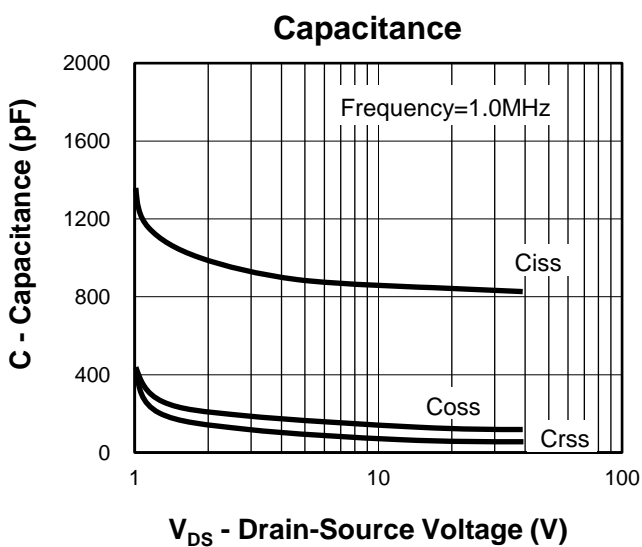
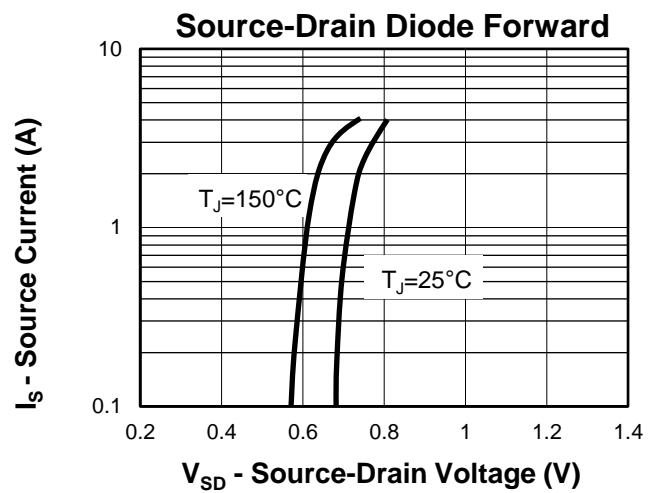
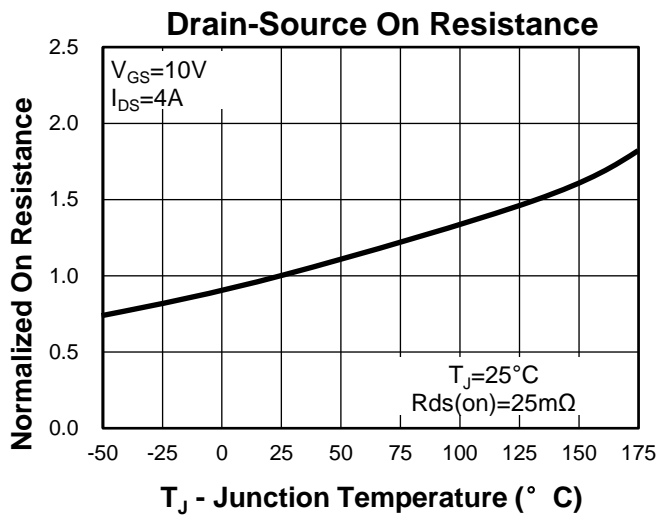
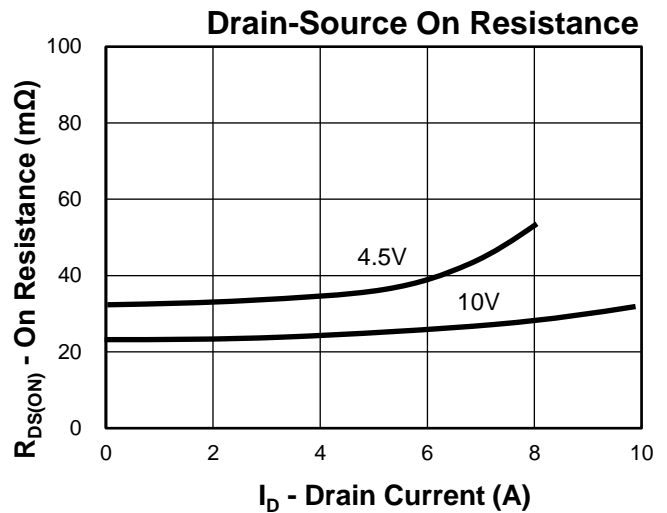
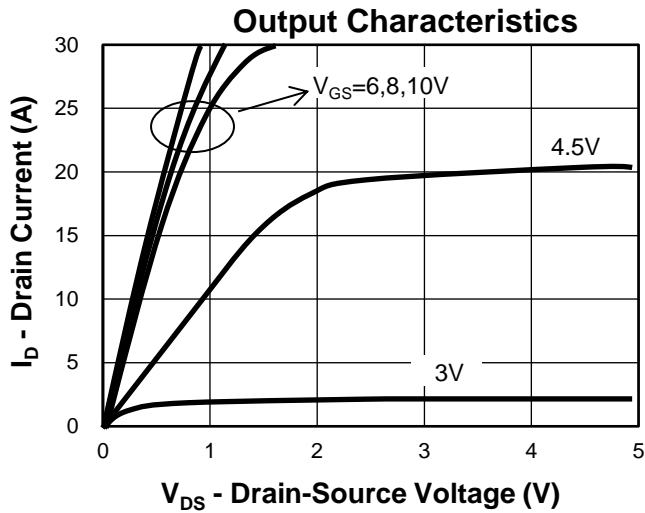
Typical Characteristics(N-Channel)



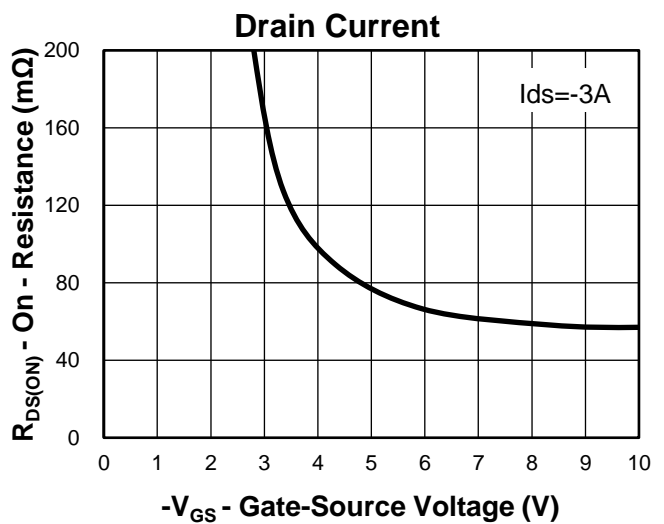
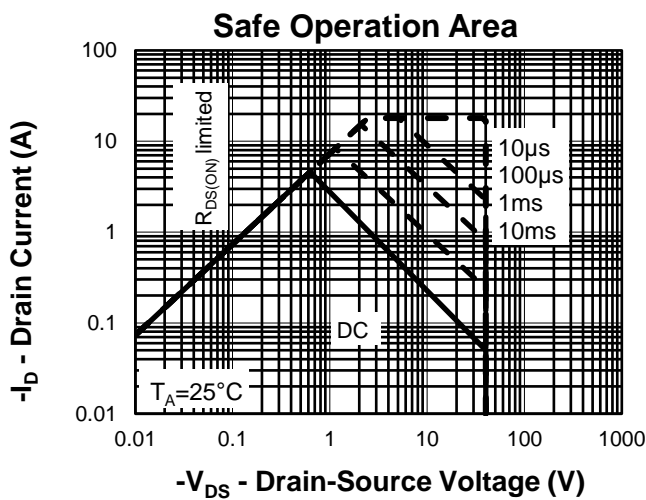
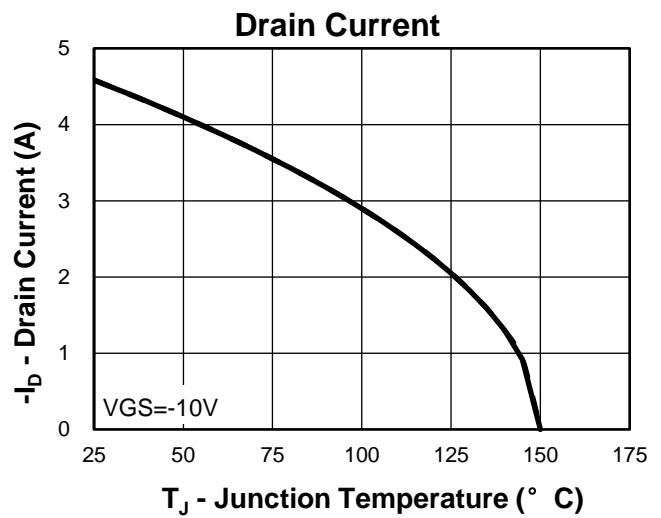
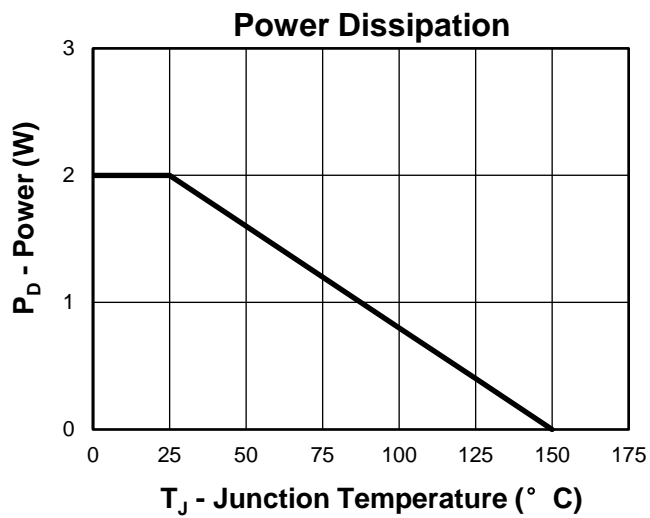
Thermal Transient Impedance



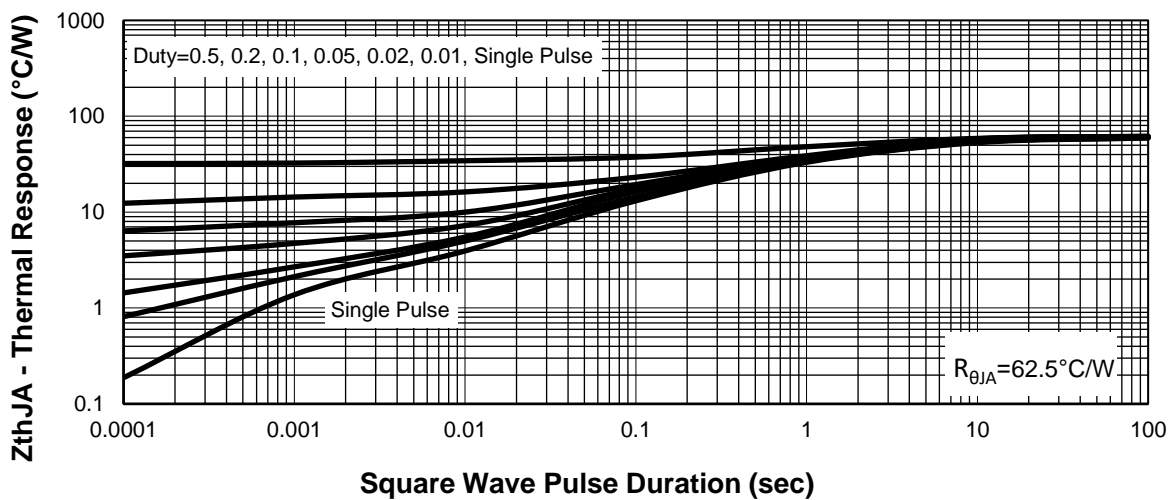
Typical Characteristics(N-Channel)

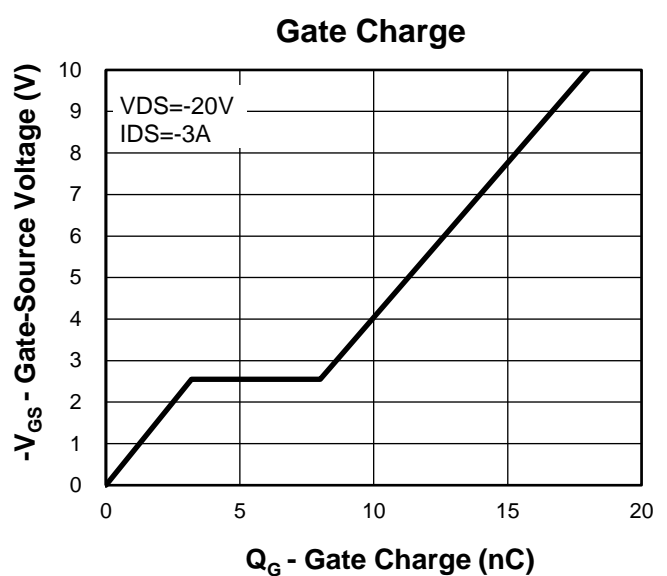
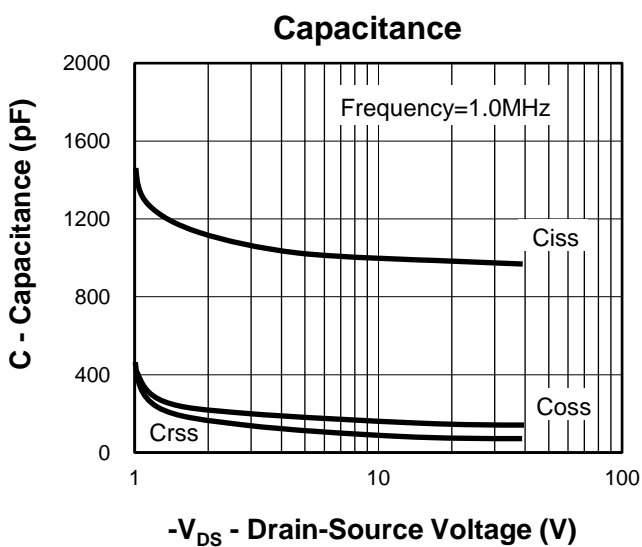
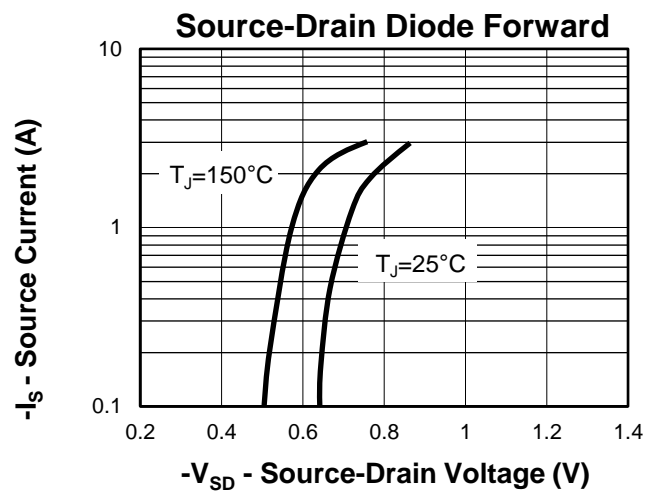
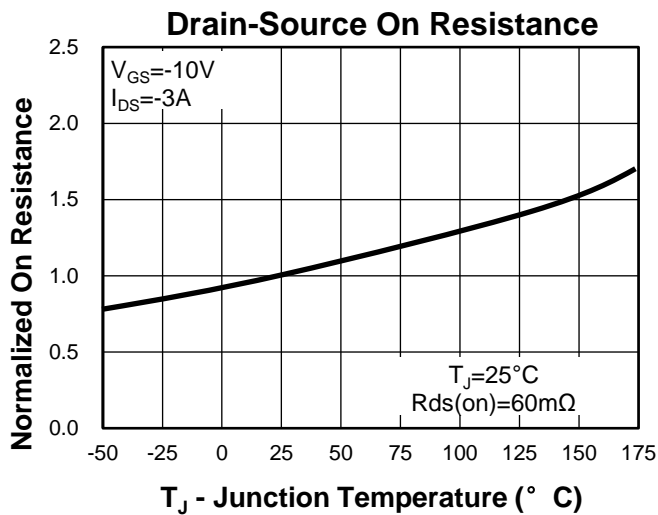
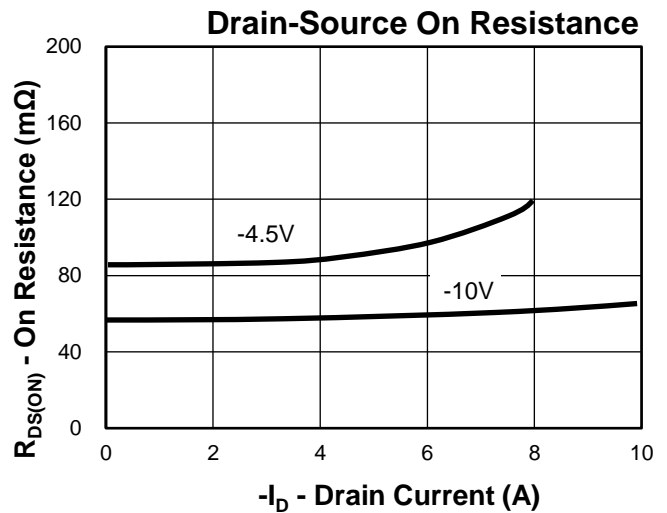
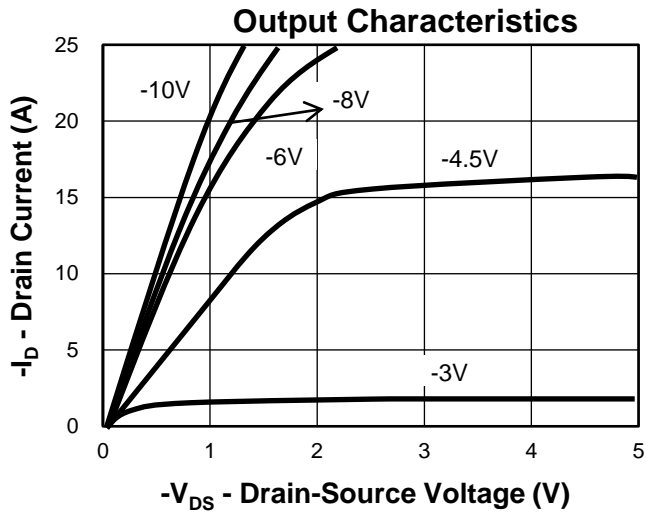


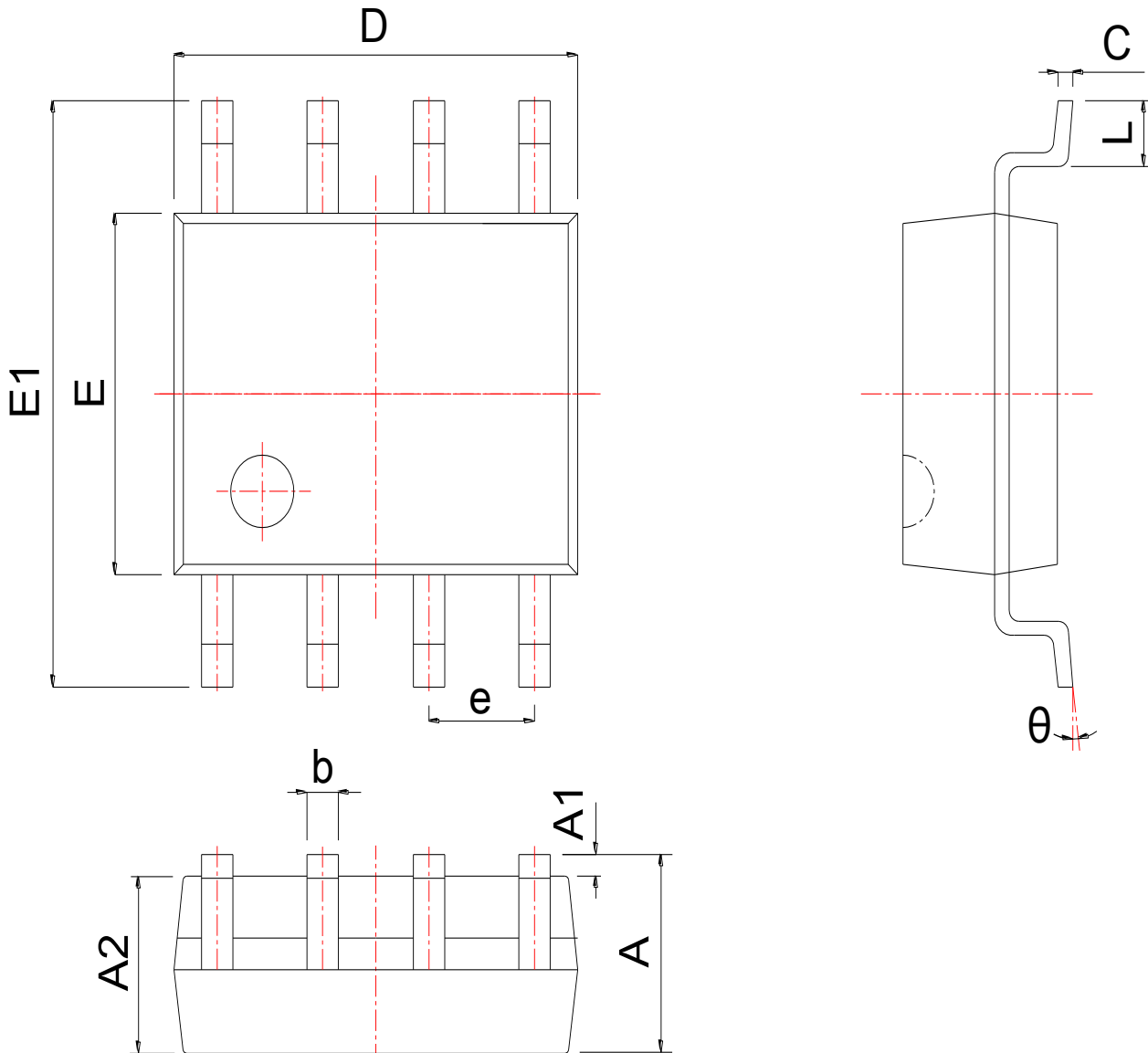
Typical Characteristics(P-Channel)



Thermal Transient Impedance

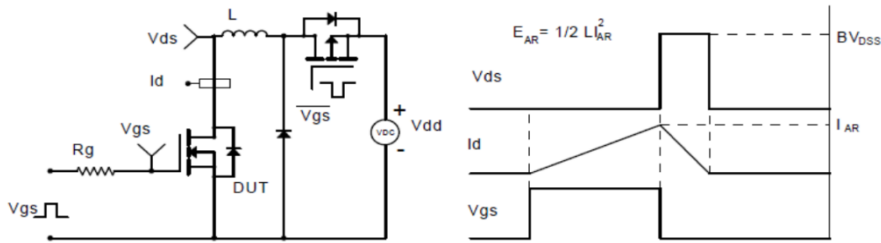


Typical Characteristics(P-Channel)


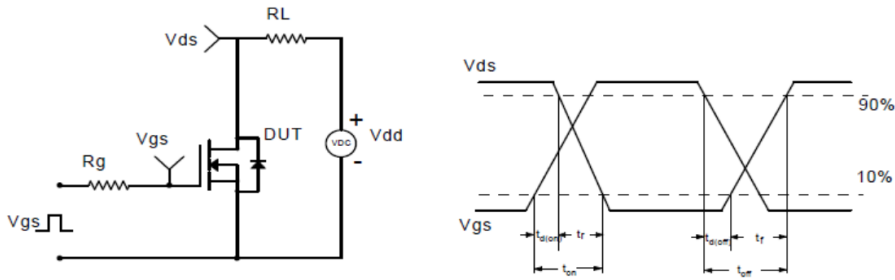
Package Information
SOP8


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°

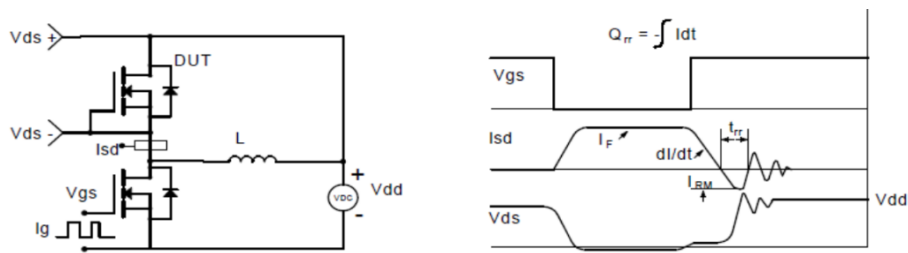
Avalanche Test Circuit and Waveforms(N-Channel)



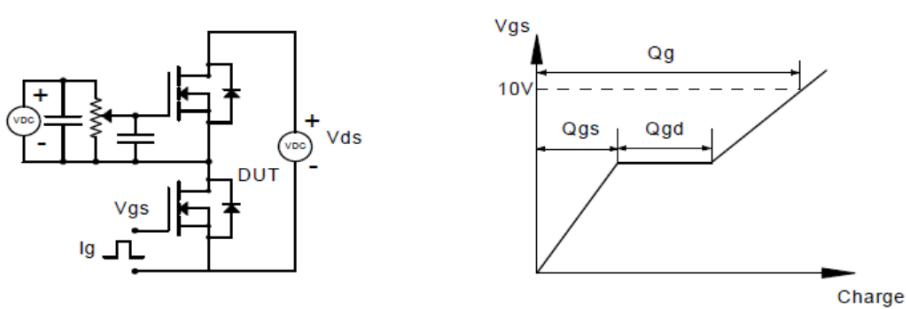
Switching Time Test Circuit and Waveforms(N-Channel)

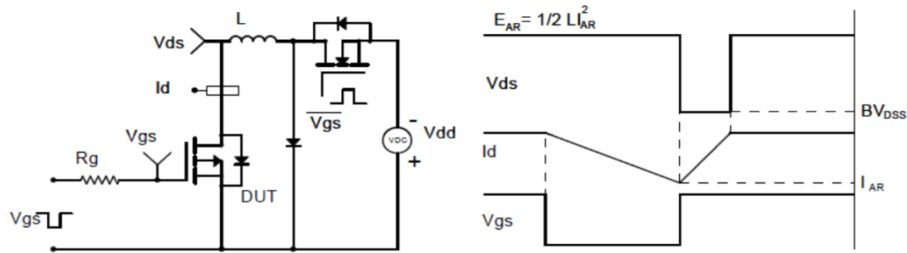
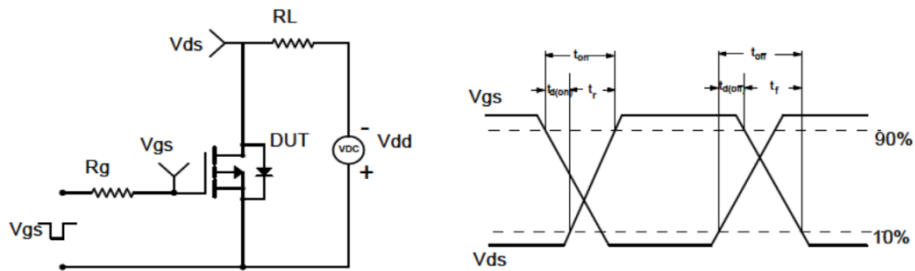
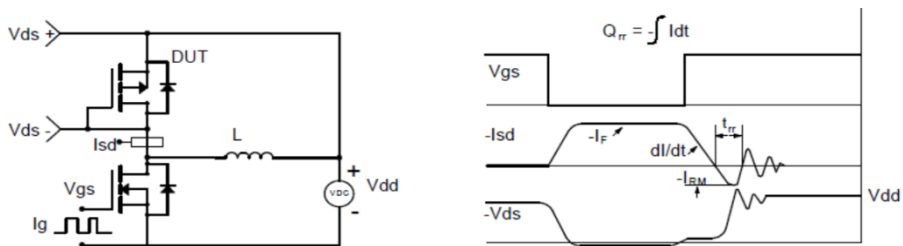
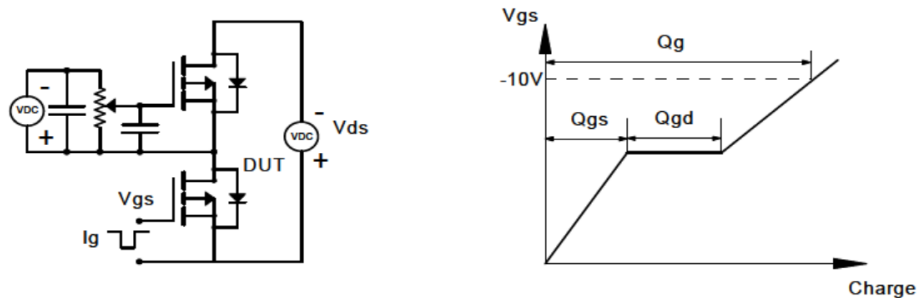


Diode Recovery Test Circuit and Waveforms(N-Channel)



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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