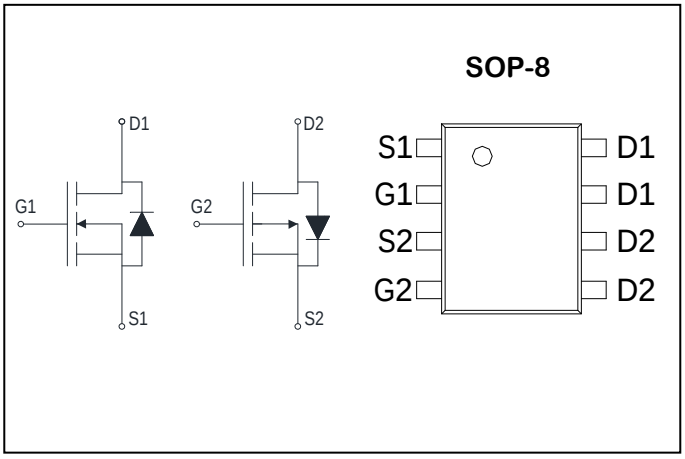
40V N & P-Channel Power Trench



PRODUCT SUMMARY

- **N-Channel**

V_{DSS}	I_D	$R_{DS(ON)}$ (mΩ)
40V	6A	28mΩ

- **P-Channel**

V_{DSS}	I_D	$R_{DS(ON)}$ (mΩ)
-40V	-6A	40mΩ

Absolute Maximum Ratings (T_A = 25°C unless otherwise specifed)

Symbol	Parameter		Ratings		Unit
			N-Channel	P-Channel	
Common Ratings					
V_{DSS}	Drain-Source Voltage		40	-40	V
V_{GSS}	Gate-Source Voltage		±20	±20	
T_J	Maximum Junction Temperature		150	150	°C
T_{STG}	Storage Temperature Range		-55 to 150		°C
I_S	Diode Continuous Forward Current	T_C=25°C	4	-4	A
Mounted on Large Heat Sink					
I_{DM}	300μs Pulse Drain Current Tested(1)	T_C=25°C	20	-20	A
I_D	Continuous Drain Current	T_C=25°C	6	-6	A
P_D	Maximum Power Dissipation		2	2	W

1. Pulse width limited by maximum junction temperature.

Thermal Characteristics

Symbol	Parameter	Ratings	Unit
RthJA	Thermal resistance junction-ambient max	N-Ch：89	°C/W
		P-CH：90	°C/W

N-CH Electrical Characteristics (T_A=25℃unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	40		-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}= 32V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}= 0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	1		2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=5A	-		28	mΩ
		V_{GS}=4.5V, I_D=4A	-		38	mΩ
Forward Transconductance	g_{FS}	V_{DS}=5V,I_D=5A	-	15	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=15V,V_{GS}=0V, F=1.0MHz	-	255	-	PF
Output Capacitance	C_{oss}		-	45	-	PF
Reverse Transfer Capacitance	C_{rss}		-	35	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=15V, R_L=3Ω V_{GS}=10V,R_{GEN}=3	-	4.5	-	nS
Turn-on Rise Time	t_r		-	2.5	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	14.5	-	nS
Turn-Off Fall Time	t_f		-	3.5	-	nS
Total Gate Charge	Q_g	V_{DS}=15V,I_D=5A, V_{GS}=10V	-	5.2	-	nC
Gate-Source Charge	Q_{gs}		-	0.85	-	nC
Gate-Drain Charge	Q_{gd}		-	1.3	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=3A	-	-	1.3	V
Diode Forward Current (Note 2)	I_S		-	-	4	A

P-CH Electrical Characteristics (T_A=25℃unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=-250μA	-40		-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-32V , V_{GS}=0V	-	-	-1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}= 0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=-250μA	-1		-2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-6A	-	35	40	mΩ
		V_{GS}=-4.5V, I_D=-3A	-	65	70	mΩ
Forward Transconductance	g_{FS}	V_{DS}=-5V,I_D=-4.1A	10	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=-15V,V_{GS}=0V, F=1.0MHz	-	700	-	PF
Output Capacitance	C_{oss}		-	120	-	PF
Reverse Transfer Capacitance	C_{rss}		-	75	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=-15V,R_L=3.6Ω	-	9	-	nS
Turn-on Rise Time	t_r	V_{GS}=-10V,R_{GEN}=3Ω	-	5	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	28	-	nS
Turn-Off Fall Time	t_f		-	13.5	-	nS
Total Gate Charge	Q_g	V_{DS}=-15V,I_D=-4A,V_{GS}=-10V	-	14	-	nC
Gate-Source Charge	Q_{gs}		-	3.1	-	nC
Gate-Drain Charge	Q_{gd}		-	3	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S= -1A	-	-	-1.3	V

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.

2. Surface Mounted on FR4 Board, t ≤ 10 sec.

3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.

4. Guaranteed by design, not subject to production

N- Channel Typical Electrical and Thermal Characteristics (Curves)

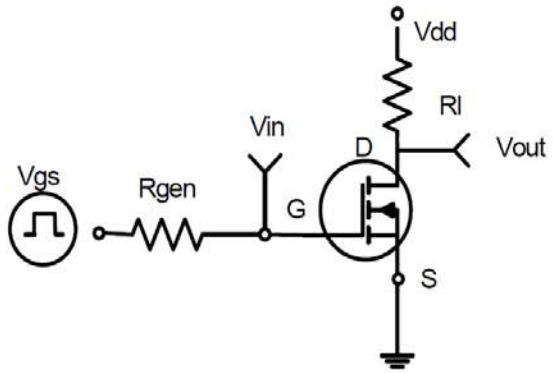


Figure 1:Switching Test Circuit

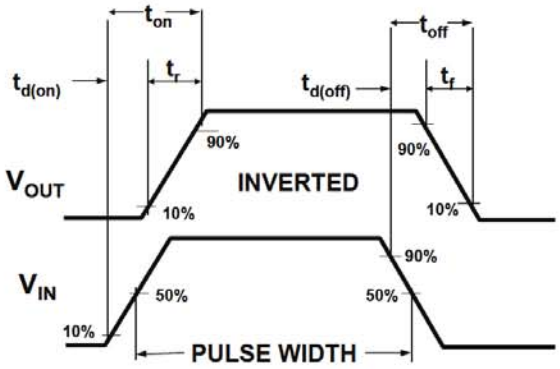


Figure 2:Switching Waveforms

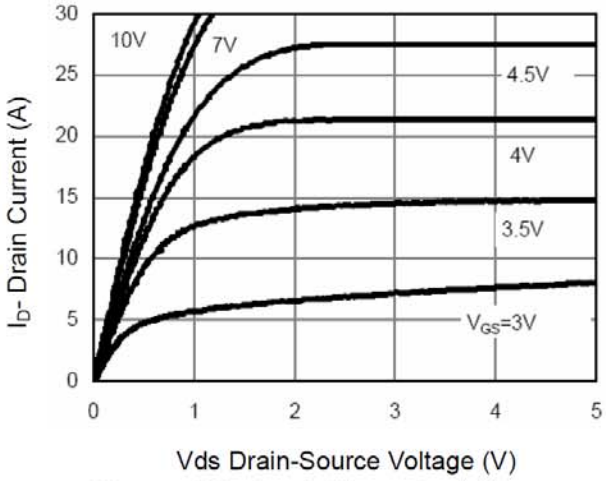


Figure 3 Output Characteristics

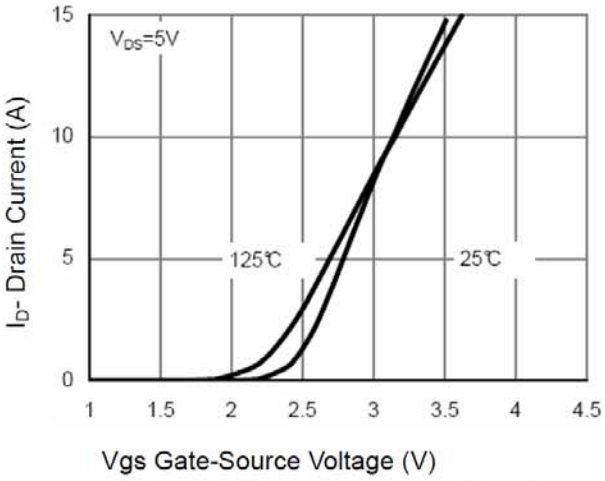


Figure 4 Transfer Characteristics

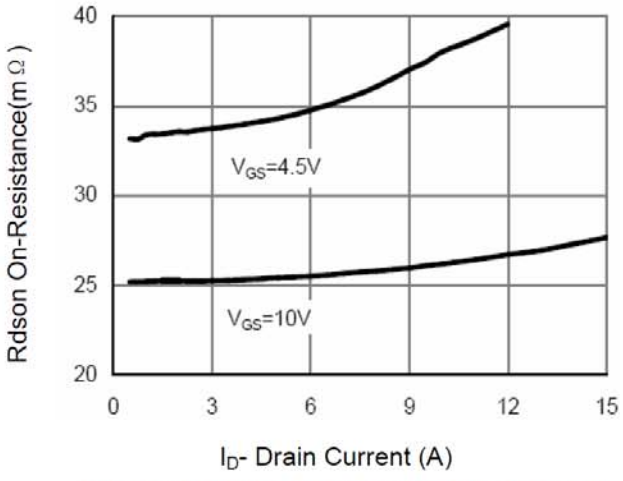


Figure 5 Drain-Source On-Resistance

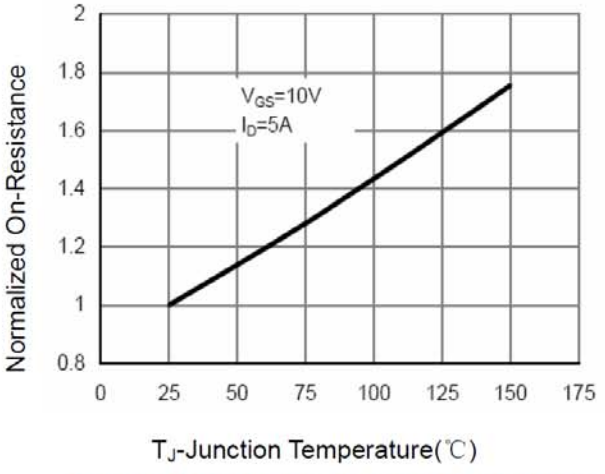


Figure 6 Drain-Source On-Resistance

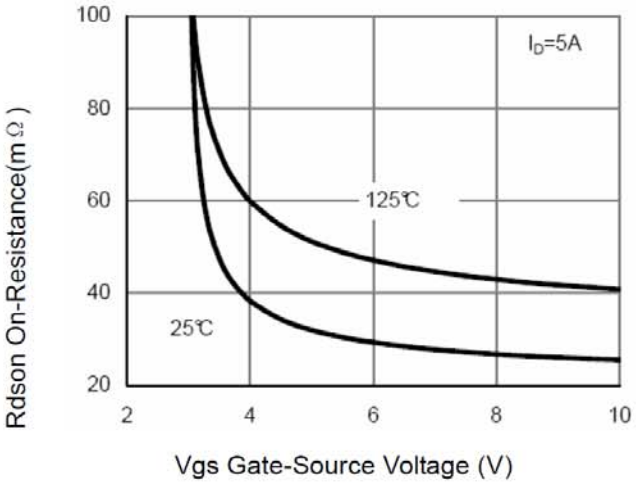


Figure7 Rdson vs Vgs

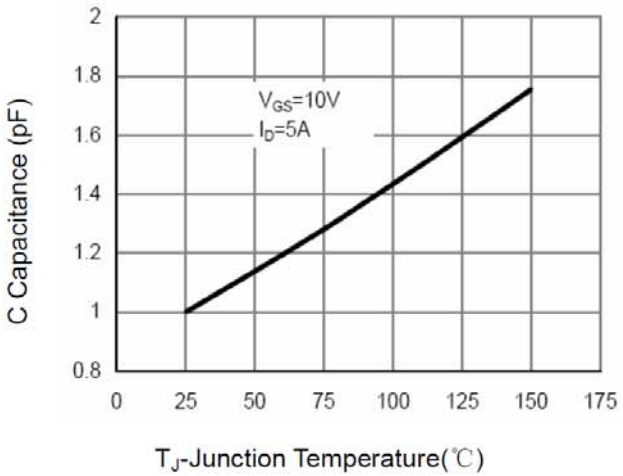


Figure 8 Drain-Source On-Resistance

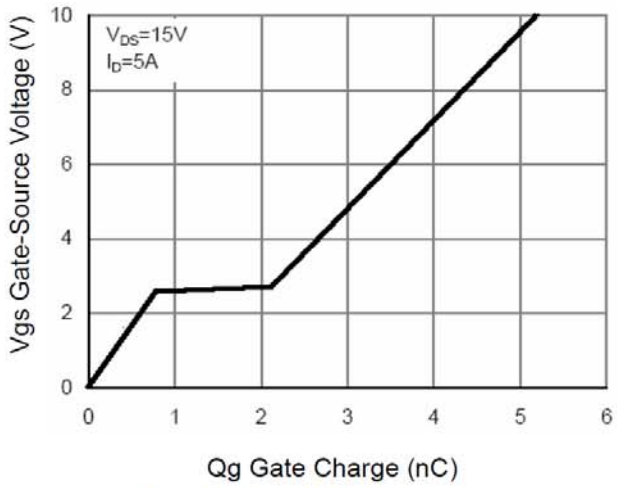


Figure 9 Gate Charge

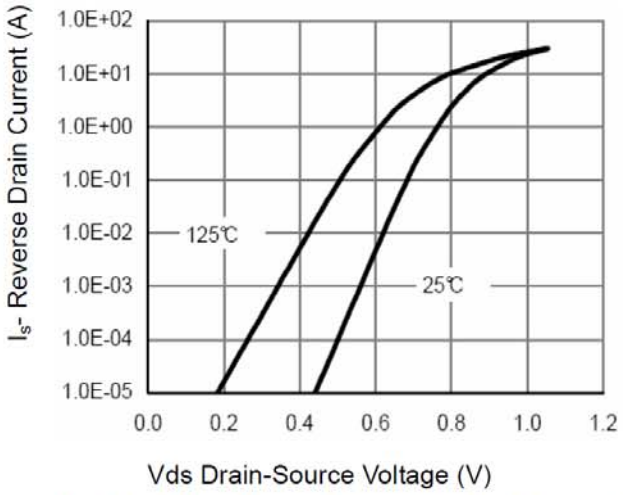


Figure 10 Source- Drain Diode Forward

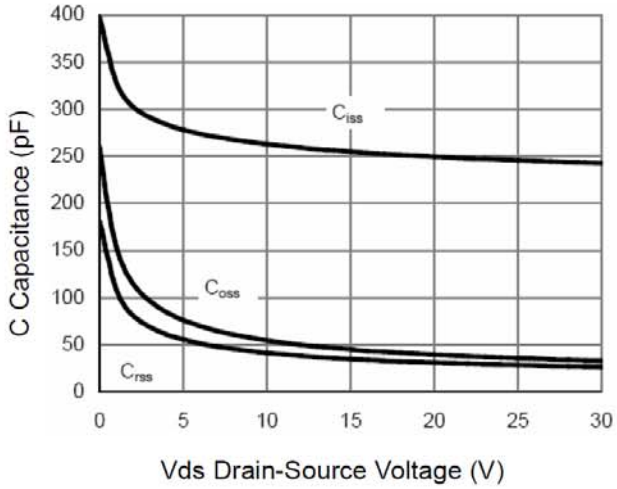


Figure 11 Capacitance vs Vds

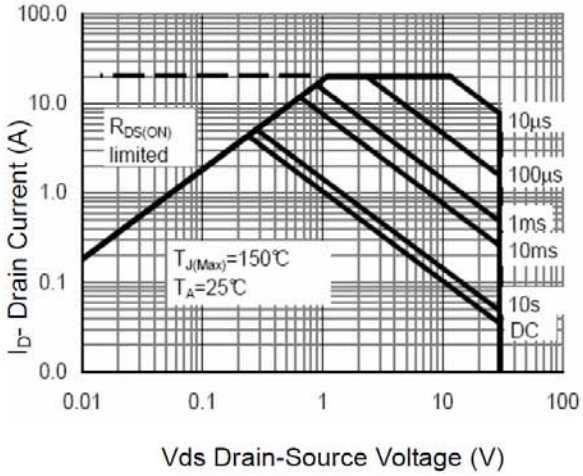


Figure 12 Safe Operation Area

P-Channel Typical Electrical and Thermal Characteristics

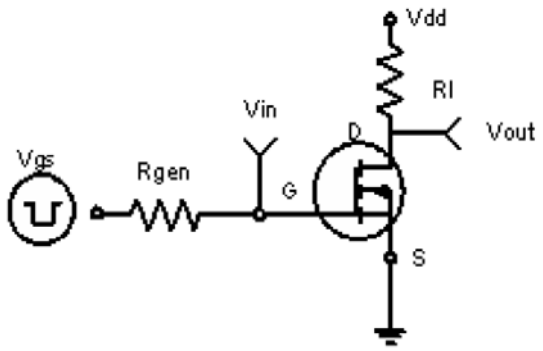


Figure 1:Switching Test Circuit

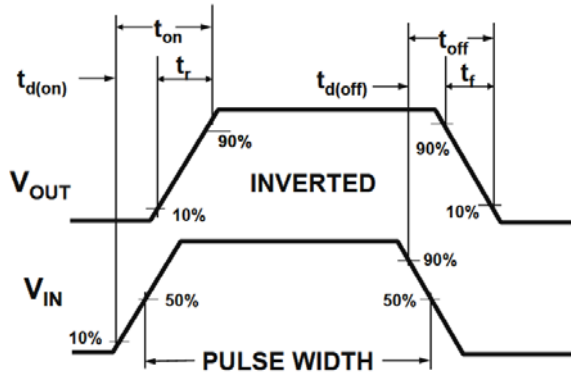


Figure 2:Switching Waveforms

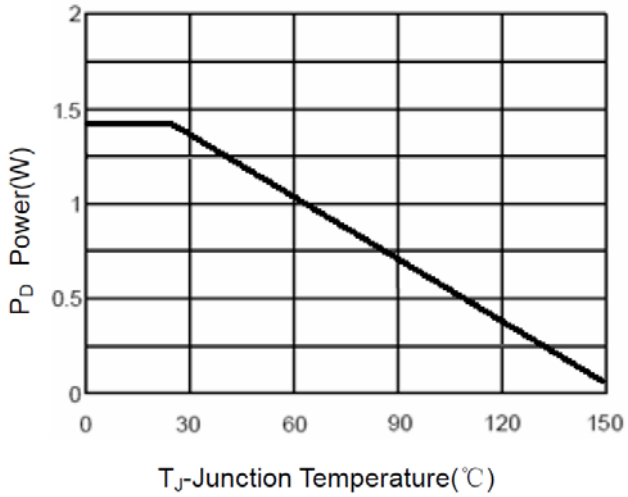


Figure 3 Power Dissipation

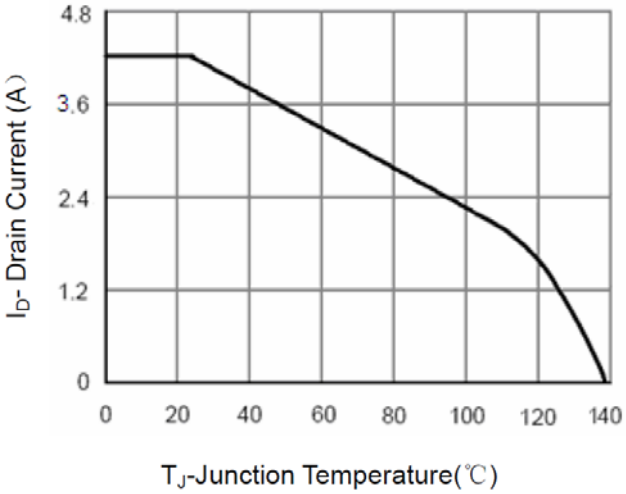


Figure 4 Drain Current

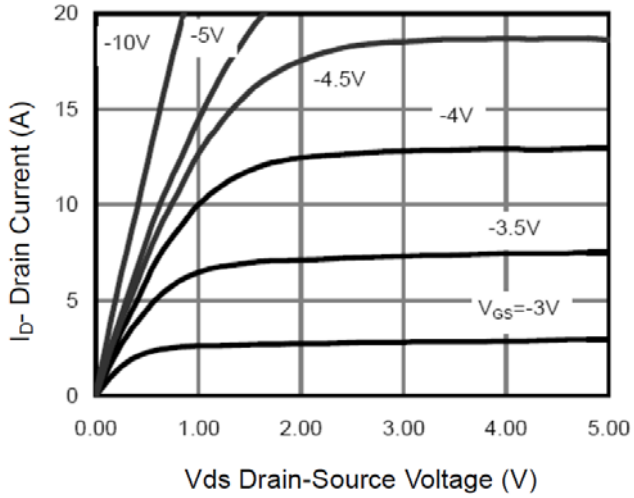


Figure 5 Output CHARACTERISTICS

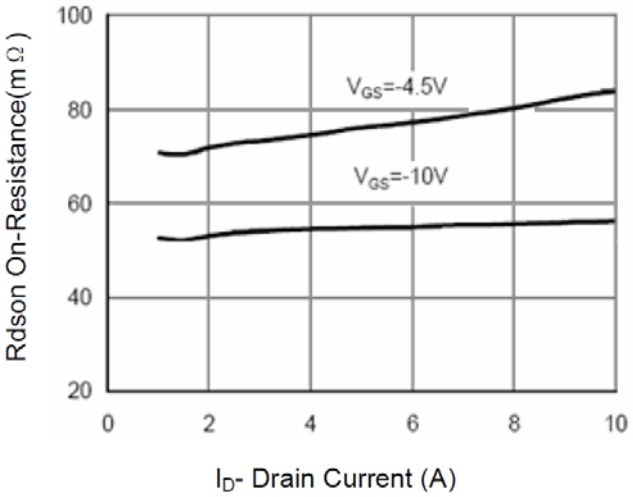


Figure 6 Drain-Source On-Resistance

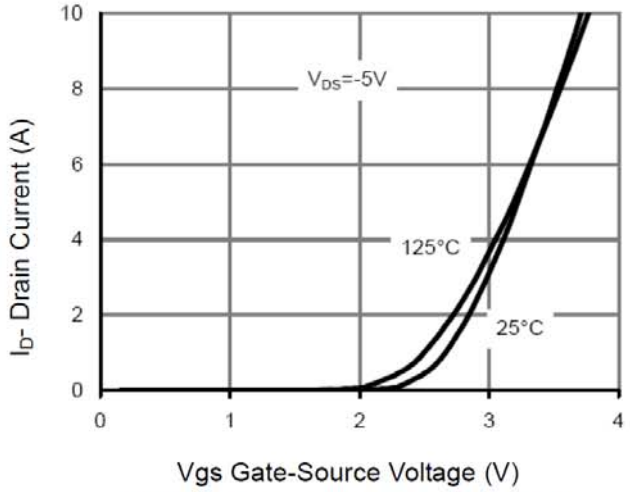


Figure 7 Transfer Characteristics

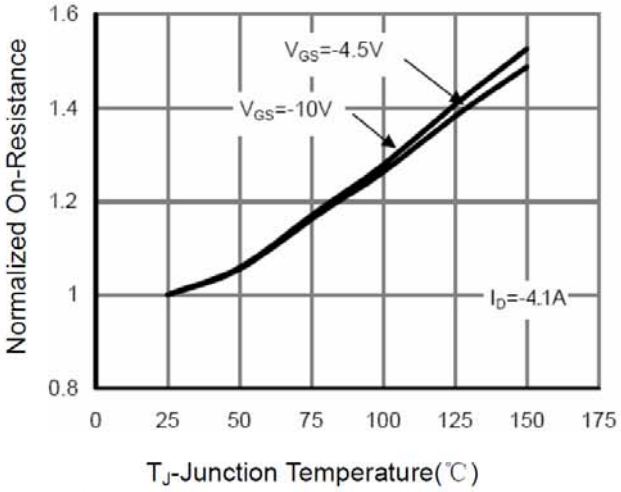


Figure 8 Drain-Source On-Resistance

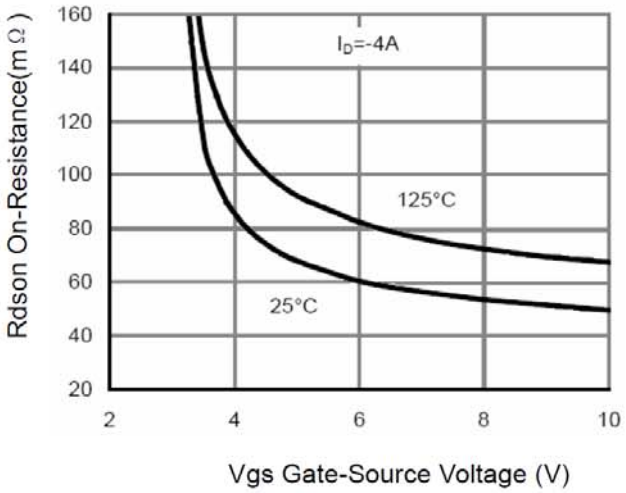


Figure 9 Rdson vs Vgs

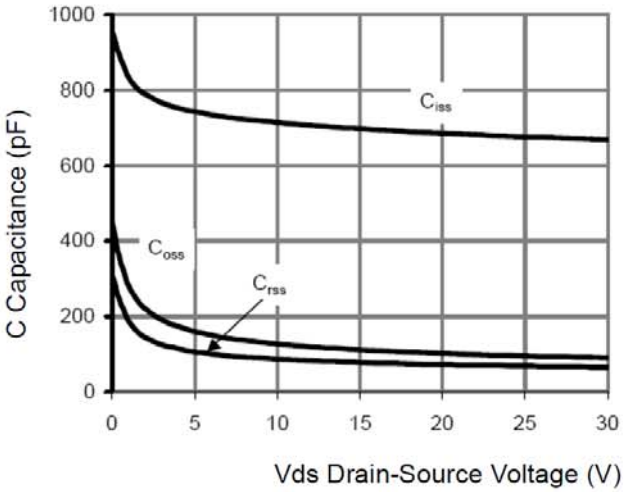


Figure 10 Capacitance vs Vds

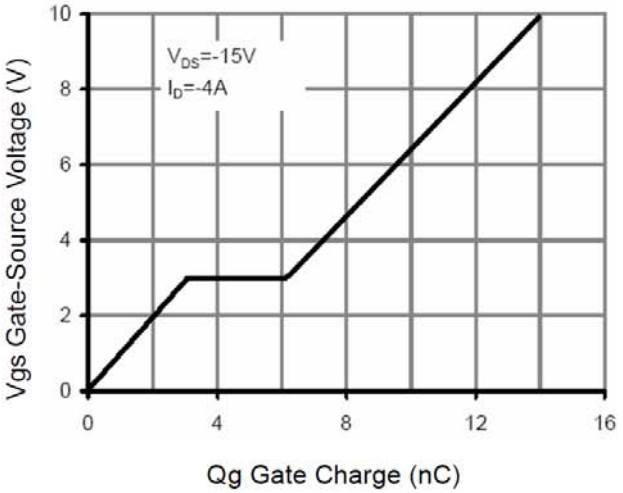


Figure 11 Gate Charge

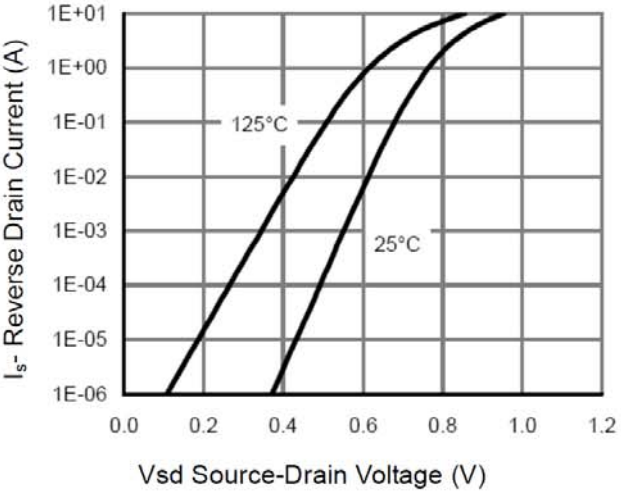


Figure 12 Source- Drain Diode Forward

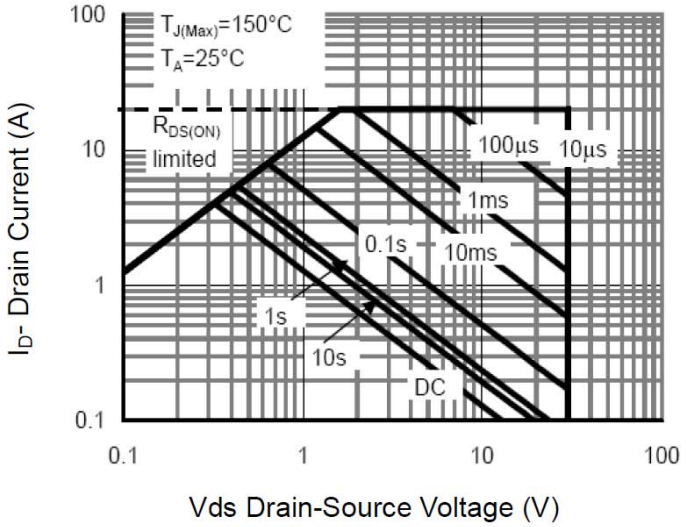


Figure 13 Safe Operation Area

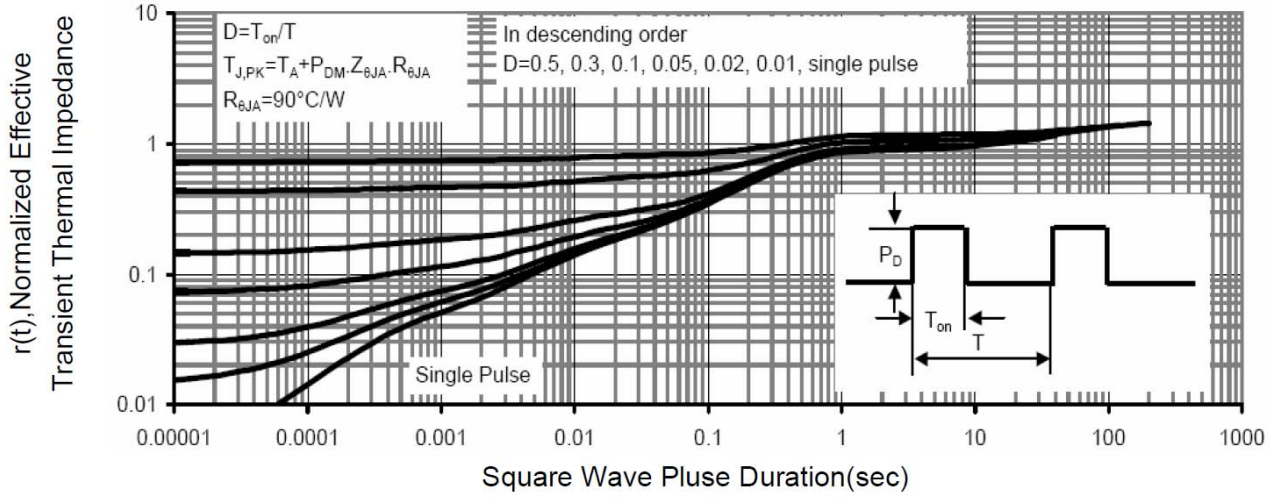
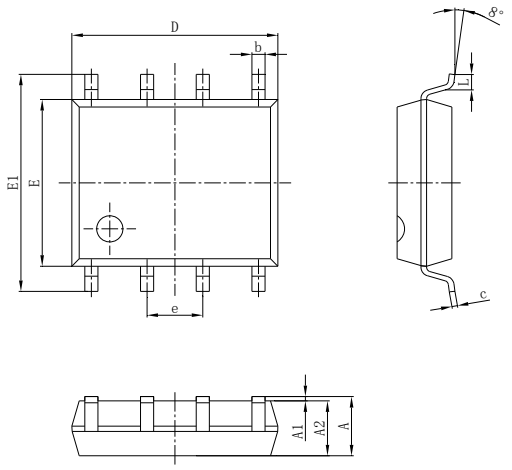


Figure 14 Normalized Maximum Transient Thermal Impedance

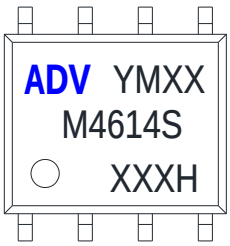
PACKAGE MECHANICAL DATA

SOP-8 Package Dimension



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E1	5.800	6.200	0.228	0.244
E	3.800	4.000	0.150	0.157
e	1.270TYP		0.050TYP	
e1	4.500	4.700	0.177	0.185
L	0.400	1.270	0.016	0.050

Making Diagram



ADV:Logo
M4614S:ADM4614S Part number
X:Internal control code
H:Halogen Free
Y:Year
M:Month

Ordering information

Part number	Package	Marking	Packing	Quantity
ADM4614S	SOP-8	M4614S	Tape&reel	4000pcs