P-Channel Enhancement Mode Power MOSFET MX4407A

DESCRIPTION

The MX4407A uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a load switch or in PWM applications.

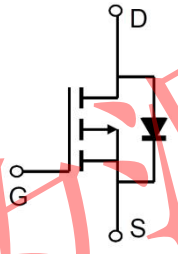
GENERAL FEATURES

- V_{DS} = -30V, I_D = -12A
  $R_{DS(ON)}$ (Type) = 9.0mΩ @ V_{GS}=-10V
  $R_{DS(ON)}$ (Type) = 12mΩ @ V_{GS}=-4.5V
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

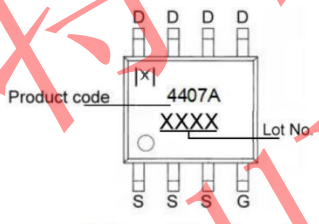
APPLICATION

- PWM applications
- Load switch
- Power management

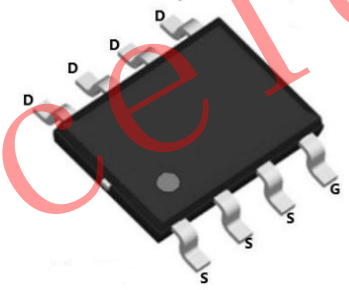
PINOUT



Schematic diagram



Marking and pin Assignment



SOP8 top view

KEY PERFORMANCE PARAMETERS

Parameter	Value	Unit
V_{DS} @ TA=25℃	-30	V
$R_{DS(on)}$(Type) @ V_{GS}=-10V	9.0	mΩ
$R_{DS(on)}$(Type) @ V_{GS}=-4.5V	12	mΩ
Q_g(Type)	61.9	nC
I_D @ TA=25℃	-14	A
P_D @ TA=25℃	2.9	W
T_J, TSTG	-55 to 150	℃

PACKAGE INFORMATION

Package	SOP8

P-Channel Enhancement Mode Power MOSFET **MX4407A**

ABSOLUTE MAXIMUM RATINGS (TA=25℃unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-30	V
Gate-Source Voltage	V_{GS}	±25	V
Drain Current-Continuous	I_D	-12	A
Drain Current-Pulsed①	I_{DM}	-56	A
Maximum Power Dissipation	P_D	2.9	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	℃

THERMAL RESISTANCE

Parameter	Symbol	Max.	Unit
Thermal Resistance, Junction-to-Ambient②	$R_{\theta JA}$	42	°C/W

Notes:

① Repetitive Rating: Pulse width limited by maximum junction temperature

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

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P-Channel Enhancement Mode Power MOSFET MX4407A

ELECTRICAL CHARACTERISTICS (TA=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	-30	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-30V,V_{GS}=0V	-	-	-1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±25V,V_{DS}=0V	-	-	±100	nA
On Characteristics ③						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-250μA	-1.2	-1.7	-2.3	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-14A	-	9.0	11.5	mΩ
		V_{GS}=-4.5V, I_D=-7A	-	12	16	mΩ
Forward Transconductance	g_{FS}	V_{DS}=-10V, I_D =-10A	20	-	-	S
Dynamic Characteristics ④						
Input Capacitance	C_{lss}	V_{DS}=-15V, V_{GS}=0V, F=1.0MHz	-	3351	-	PF
Output Capacitance	C_{oss}		-	327.6	-	PF
Reverse Transfer Capacitance	C_{rss}		-	285	-	PF
Switching Characteristics ④						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=-15V, I_D=-10A, V_{GS}=-10V,R_{GEN}=3Ω	-	12	-	nS
Turn-on Rise Time	t_r		-	7	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	53	-	nS
Turn-Off Fall Time	t_f		-	16.5	-	nS
Total Gate Charge	Q_g	V_{DS}=30V, I_D=2.5A, V_{GS}=4.5V	-	61.9	-	nC
Gate-Source Charge	Q_{gs}		-	9.85	-	nC
Gate-Drain Charge	Q_{gd}		-	11.5	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage ③	V_{SD}	V_{GS}=0V,I_S=-14A	-	-0.7	-1.2	V

Notes:

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

④ Guaranteed by design, not subject to production

TYPICAL CHARACTERISTICS(TJ = 25ºC, unless otherwise noted)

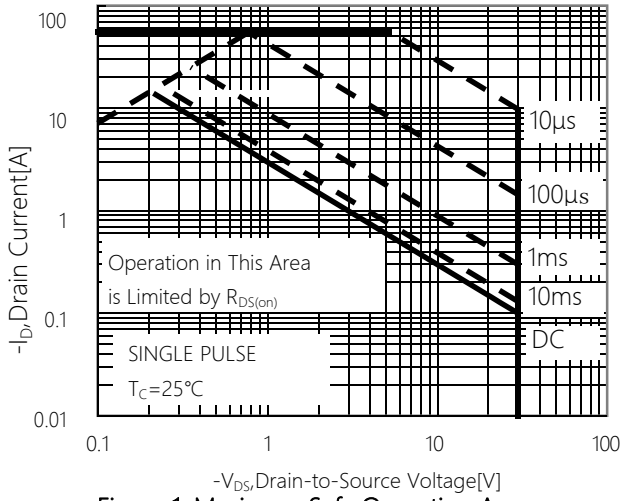

Figure 1: Maximum Safe Operating Area

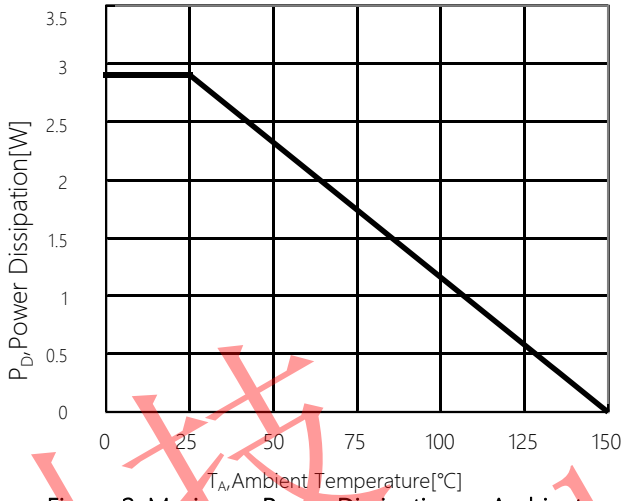

Figure 2: Maximum Power Dissipation vs Ambient Temperature

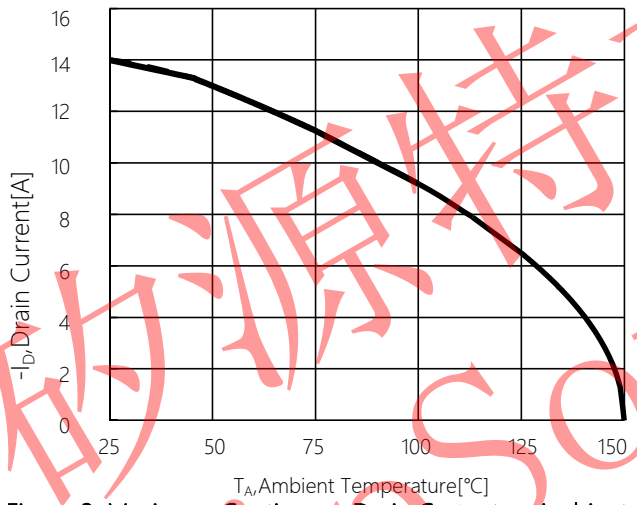

Figure 3: Maximum Continuous Drain Current vs Ambient Temperature

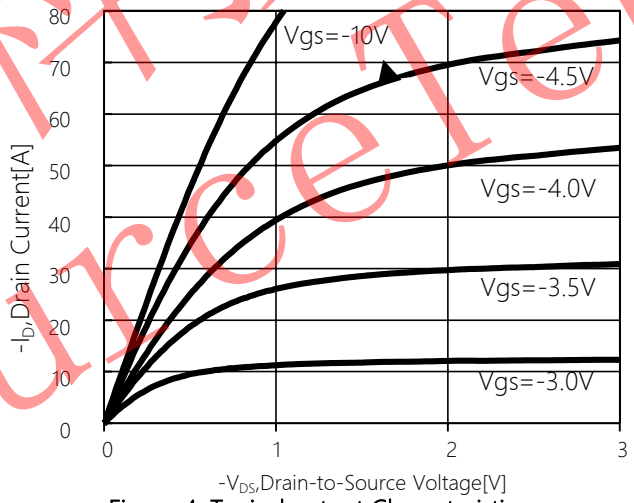

Figure 4: Typical output Characteristics

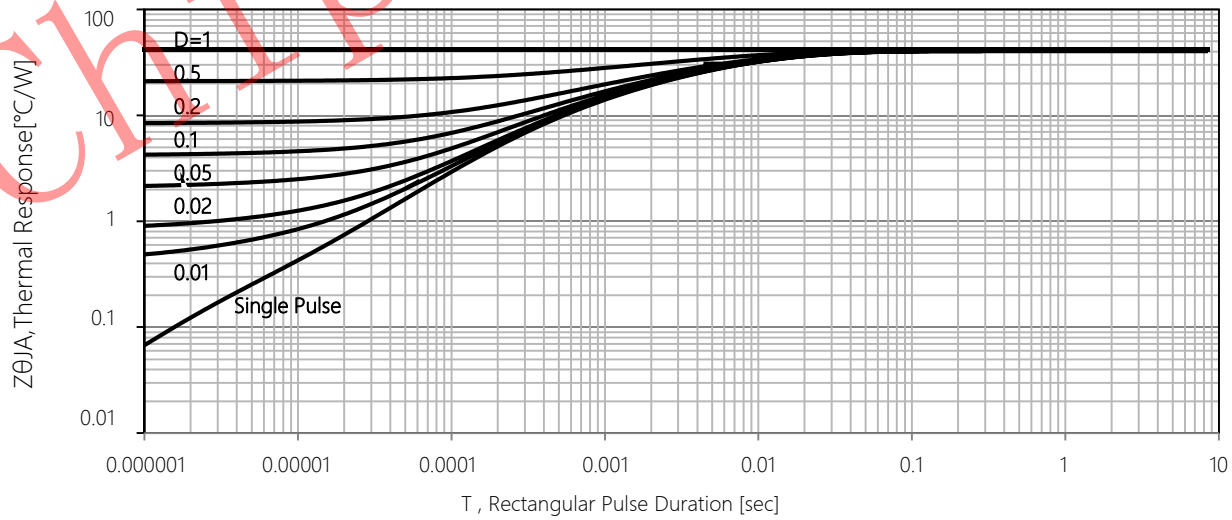

Figure 5: Maximum Effective Thermal Impedance , Junction to Ambient

TYPICAL CHARACTERISTICS(TJ = 25ºC, unless otherwise noted)

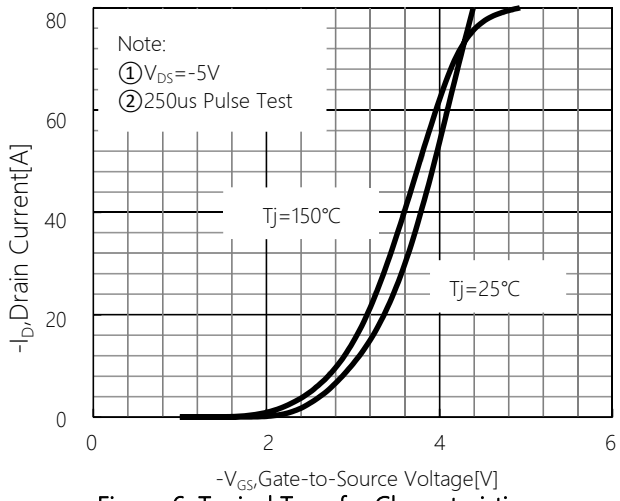

Figure 6: Typical Transfer Characteristics

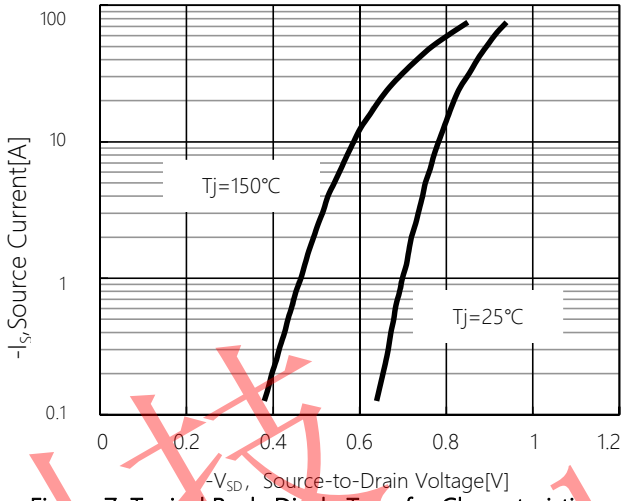

Figure 7: Typical Body Diode Transfer Characteristics

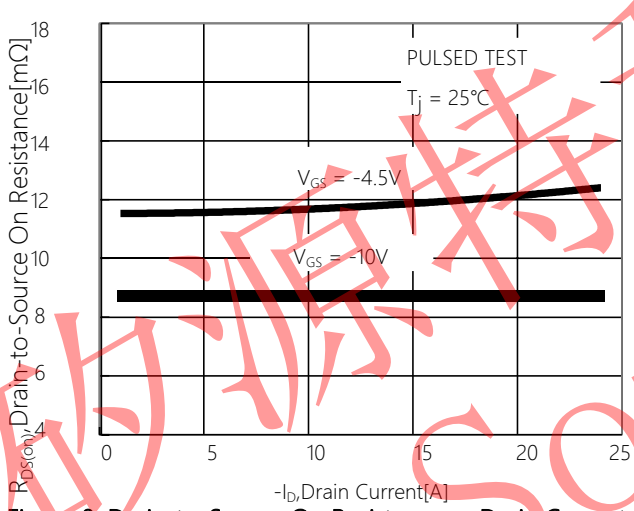

Figure 8: Drain-to-Source On Resistance vs Drain Current

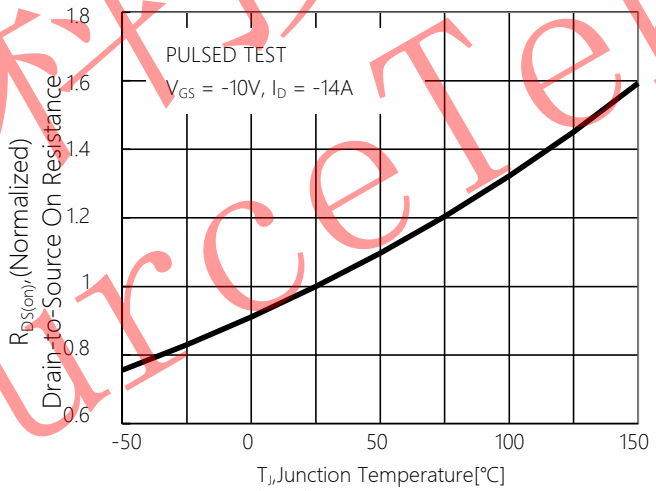

Figure 9: Normalized On Resistance vs Junction Temperature

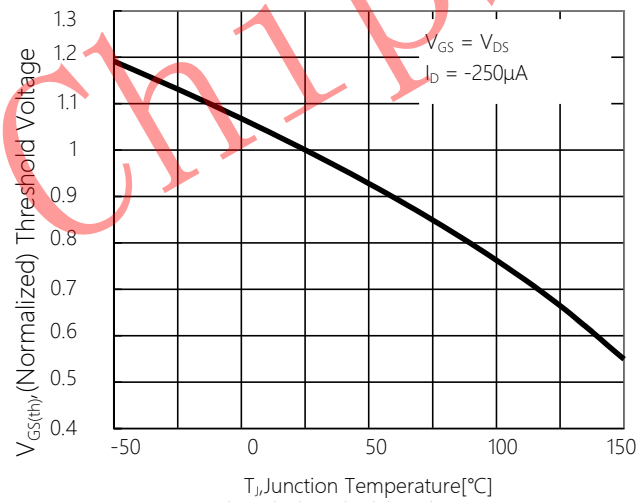

Figure 10: Normalized Threshold Voltage vs Junction Temperature

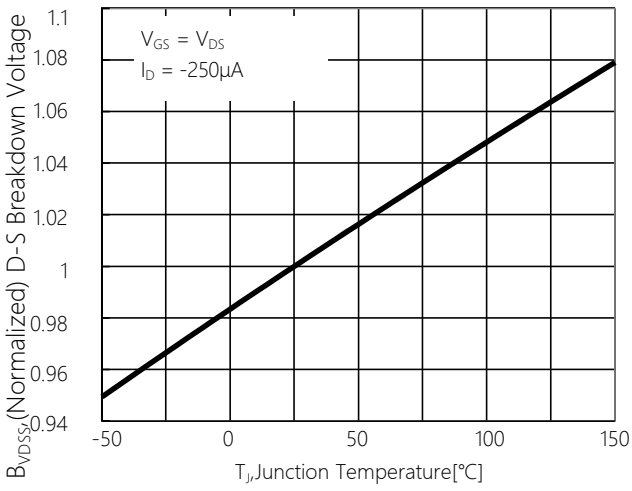

Figure 11: Normalized Breakdown Voltage vs Junction Temperature

TYPICAL CHARACTERISTICS(TJ = 25ºC, unless otherwise noted)

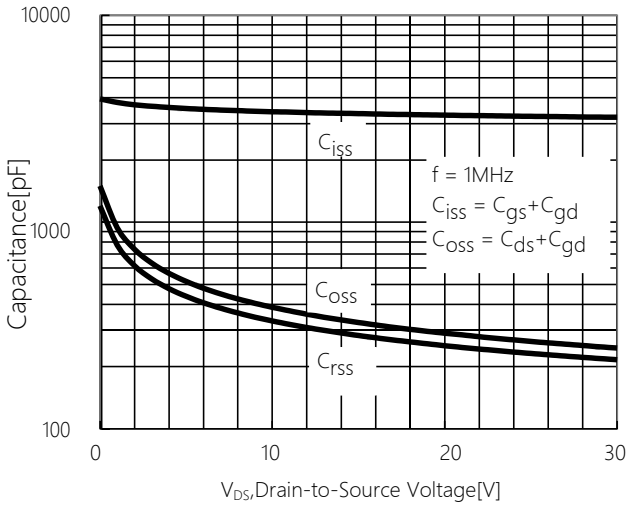

Figure 12: Capacitance Characteristics

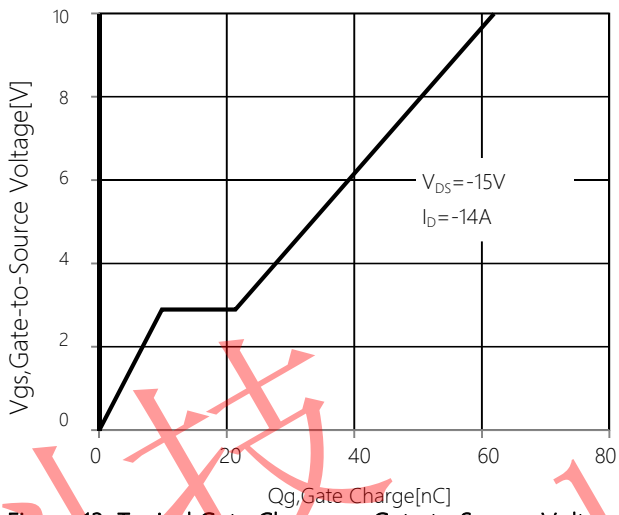

Figure 13: Typical Gate Charge vs Gate to Source Voltage

TEST CIRCUIT AND WAVEFORM

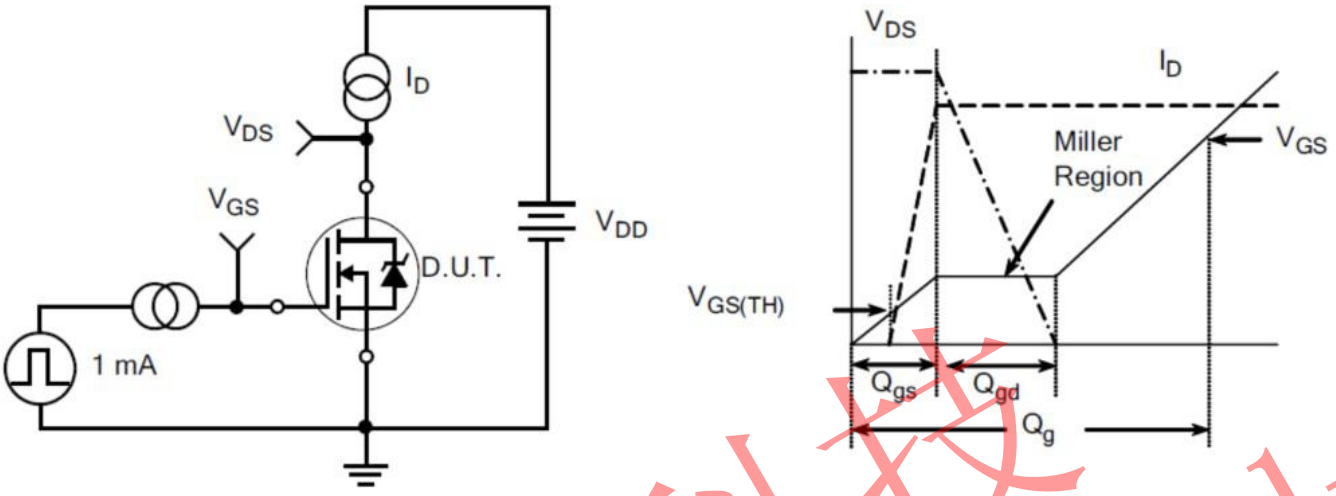

Figure A: Gate Charge Test Circuit and Waveform

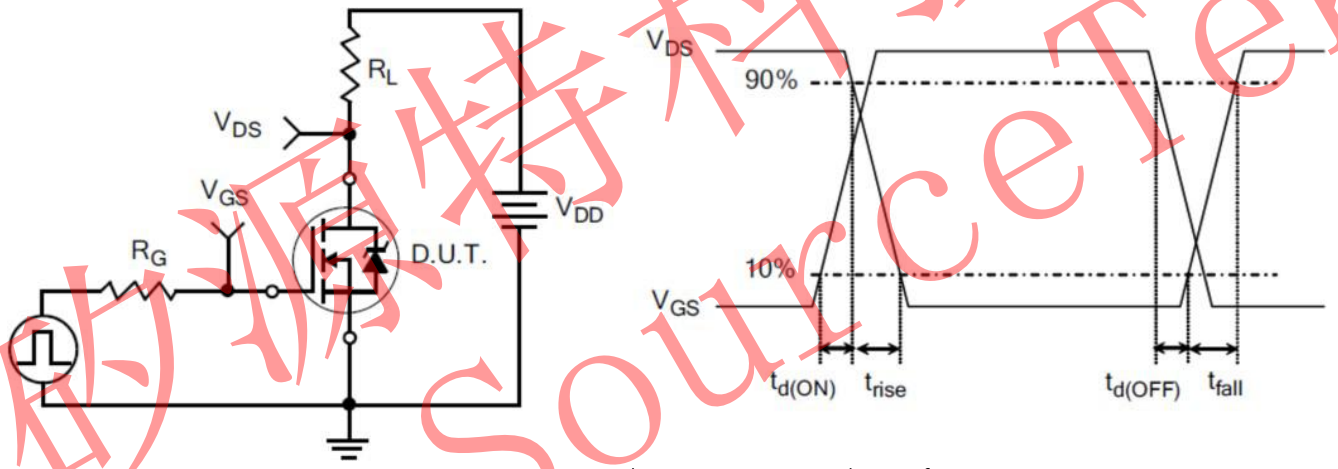

Figure B: Resistive Switching Test Circuit and Waveform

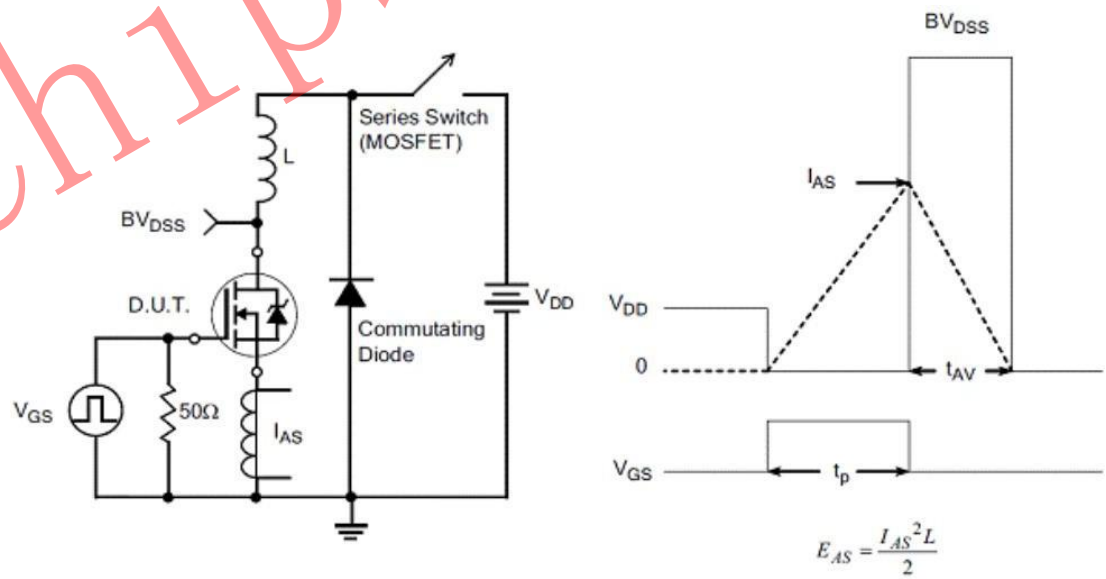

Figure C: Unclamped Inductive Switching Test Circuit and Waveform

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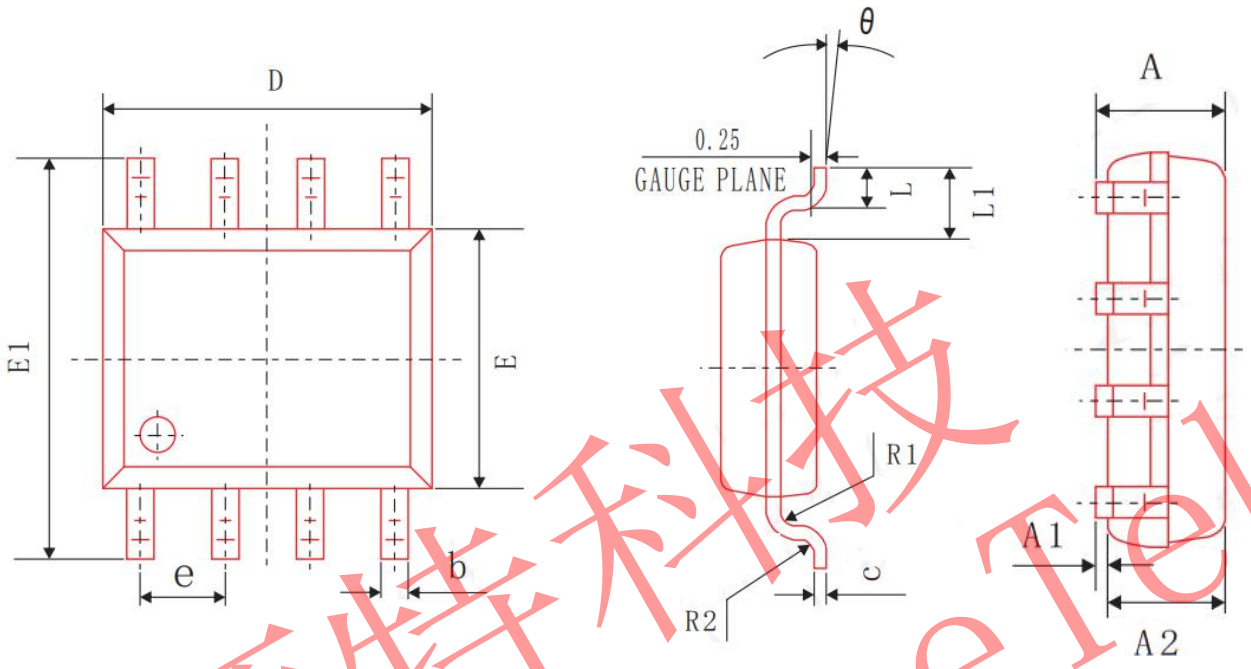
PACKAGE INFORMATION

SOP8



COMMON DIMENSIONS IN MILLIMETERS

SYMBOL	MIN	NOM	MAX
A	1.40	1.60	1.80
A1	0.05	0.15	0.25
A2	1.35	1.45	1.55
b	0.30	0.40	0.50
c	0.153	0.203	0.253
D	4.80	4.90	5.00
E	3.80	3.90	4.00
E1	5.80	6.00	6.20
L	0.45	0.70	1.00
θ	2°	4°	6°
L1	1.04 REF		
e	1.27 BSC		
R1	0.07 TYP		
R2	0.07 TYP		