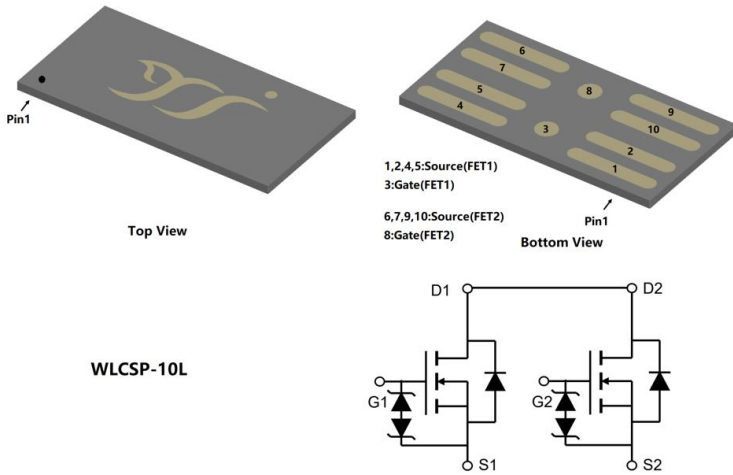


N-Channel Enhancement Mode Field Effect Transistor



Product Summary

• V_{SS}	12V
• I_S	13A
• $R_{SS(ON)}$ (at $V_{GS}=4.5V$)	<2.4m Ω
• $R_{SS(ON)}$ (at $V_{GS}=3.8V$)	<2.7m Ω
• $R_{SS(ON)}$ (at $V_{GS}=3.1V$)	<3.5m Ω
• $R_{SS(ON)}$ (at $V_{GS}=2.5V$)	<5.5m Ω

General Description

- Trench MOSFET technology
- Extremely Low $R_{SS(ON)}$
- ESD HBM Class 2
- Common Drain Design
- RoHS compliant
- Halogen-free

Applications

- Battery Protection

Limiting Values

Parameter	Conditions		Symbol	Min	Max	Unit
Source-source Voltage			V_{SS}	-	12	V
Gate-source Voltage			V_{GS}	-8	8	
Continuous Source Current (Note 1,2)	Steady-State	$T_A=25^{\circ}C, V_{GS}=4.5V$	I_S	-	13	A
		$T_A=100^{\circ}C, V_{GS}=4.5V$		-	10	
Pulsed Source Current	$T_A=25^{\circ}C, t_p \leq 10\mu s$		I_{SM}	-	52	
Maximum Body-Diode Continuous Current	$T_A=25^{\circ}C$		I_S		13	
Total Power Dissipation (Note 1,2)	Steady-State	$T_A=25^{\circ}C$	P_D	-	0.5	W
Junction and Storage Temperature Range			T_J, T_{STG}	-55	150	$^{\circ}C$

Thermal Resistance

Parameter		Symbol	Typ	Max	Units
Thermal Resistance Junction-to-Ambient (Note 2)	Steady-State	$R_{\theta JA}$	-	250	$^{\circ}C/W$

Ordering Information (Example)

PREFERRED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
YJZ2D4N012AJ	F1	2D4N012AJ	5000	/	/	Tape Reel



YJZ2D4N012AJ

■ Electrical Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static Parameter						
Source-Source Breakdown Voltage	BV _{SSS}	V _{GS} =0V,I _S =250μA,T _j =25℃	12	-	-	V
Zero Gate Voltage Source Current	I _{SSS}	V _{SS} =12V,V _{GS} =0V,T _j =25℃	-	-	1	μA
		V _{SS} =12V,V _{GS} =0V,T _j =150℃	-	-	100	
Gate-Source Leakage Current	I _{GSS}	V _{GS} =±8V,V _{DS} =0V,T _j =25℃	-	-	±10	
Gate Threshold Voltage	V _{GS(th)}	V _{SS} =V _{GS} ,I _S =1mA,T _j =25℃	0.55	0.9	1.3	V
Static Source-Source On-Resistance	R _{SS(ON)}	V _{GS} =4.5V,I _S =4A,T _j =25℃	1.6	2.15	2.4	mΩ
		V _{GS} =3.8V,I _S =4A,T _j =25℃	1.8	2.35	2.7	
		V _{GS} =3.1V,I _S =4A,T _j =25℃	2	2.7	3.5	
		V _{GS} =2.5V,I _S =4A,T _j =25℃	2.2	3.5	5.5	
Diode Forward Voltage	V _{SS}	I _S =4A,V _{GS} =0V,T _j =25℃	-	0.6	1.2	V
Gate Resistance	R _G	f=1MHz,T _j =25℃	-	620	-	Ω
Dynamic Parameters						
Input Capacitance	C _{ISS}	V _{SS} =10V,V _{GS} =0V,f=1MHz,T _j =25℃	-	3500	-	pF
Output Capacitance	C _{OSS}		-	450	-	
Reverse Transfer Capacitance	C _{RSS}		-	400	-	
Switching Parameters						
Total Gate Charge	Q _g	V _{GS} =4.5V,V _{DD} =6V,I _S =4A,T _j =25℃	-	23	-	nC
Gate-Source Charge	Q _{gs}		-	11	-	
Gate-Drain Charge	Q _{gd}		-	5	-	
Turn-on Delay Time	t _{D(on)}	V _{GS} =4.5V,V _{DD} =6V,I _S =4A,R _{GEN} =3Ω, T _j =25℃	-	0.6	-	ns
Turn-on Rise Time	t _r		-	1.4	-	
Turn-off Delay Time	t _{D(off)}		-	6.6	-	
Turn-off Fall Time	t _f		-	4	-	

Note:

- The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
- The value of $R_{\theta JA}$ is measured with the device mounted on the 40mm*40mm*1.1mm single layer FR-4 PCB board with 1 in² pad of 2oz. Copper, in the still air environment with $T_A=25^\circ C$. The maximum allowed junction temperature of $150^\circ C$. The value in any given application depends on the user's specific board design.

■ Typical Electrical and Thermal Characteristics Diagrams

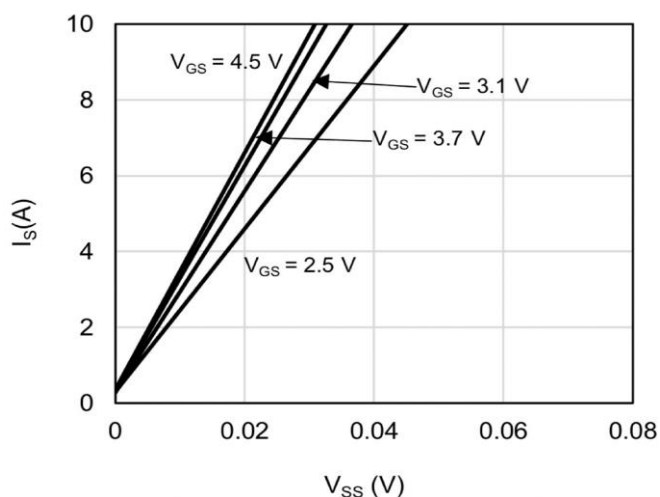


Figure 1. Output Characteristics; typical values

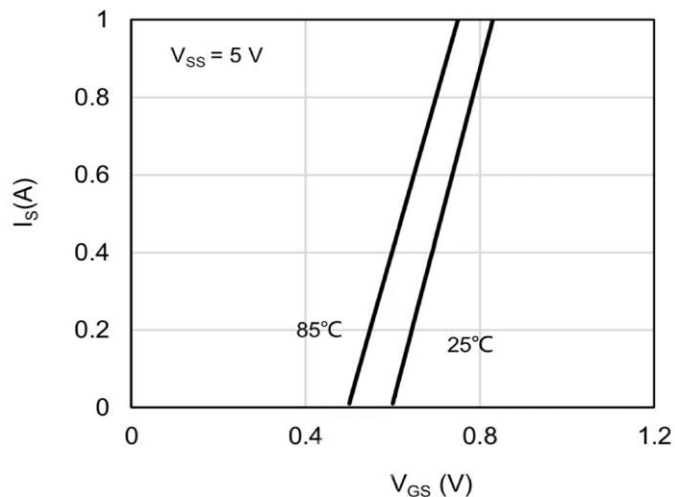


Figure 2. Transfer Characteristics; typical values

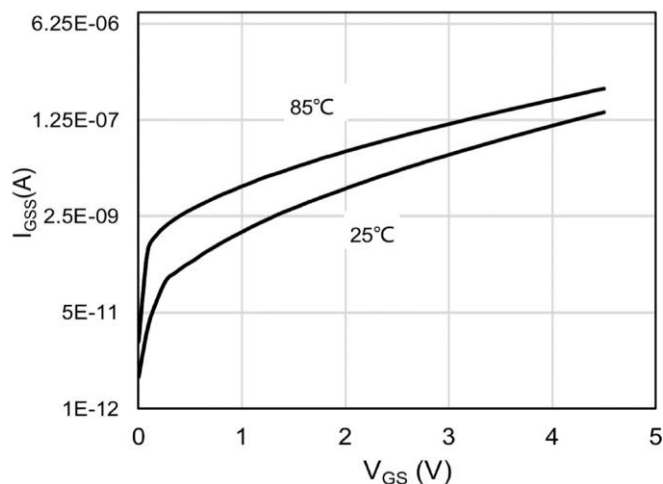


Figure 3. Gate Voltage vs. Gate Leakage Current; typical values

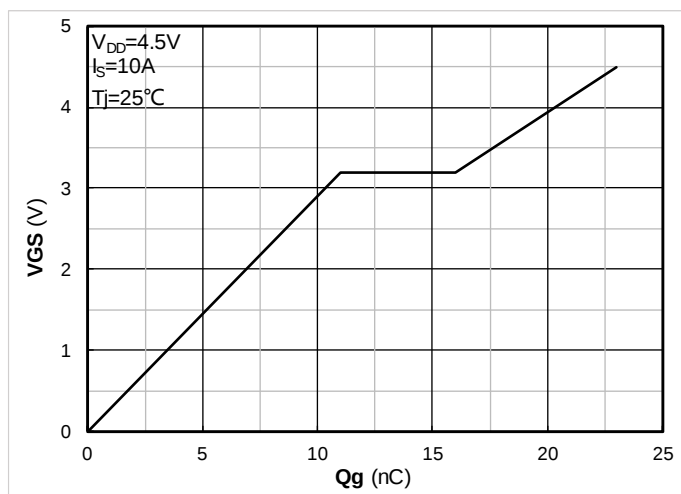


Figure 4. Gate Charge; typical values

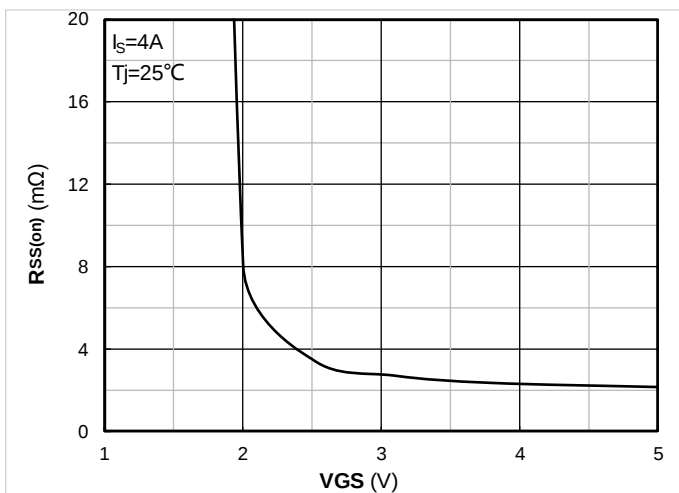


Figure 5. On-Resistance vs. Gate to Source Voltage; typical values

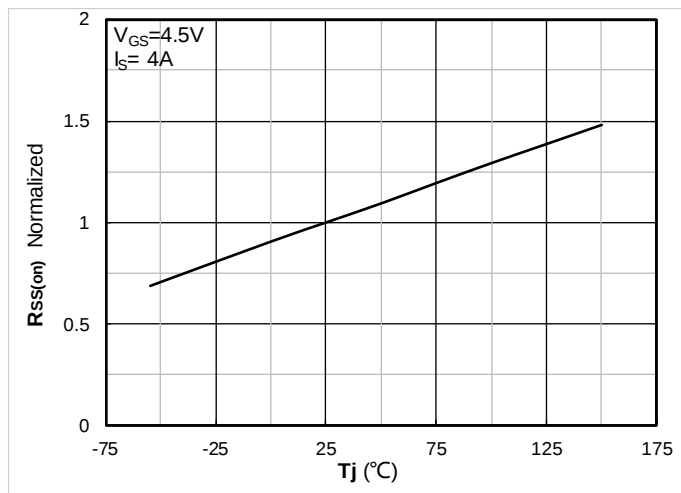


Figure 6. Normalized On-Resistance

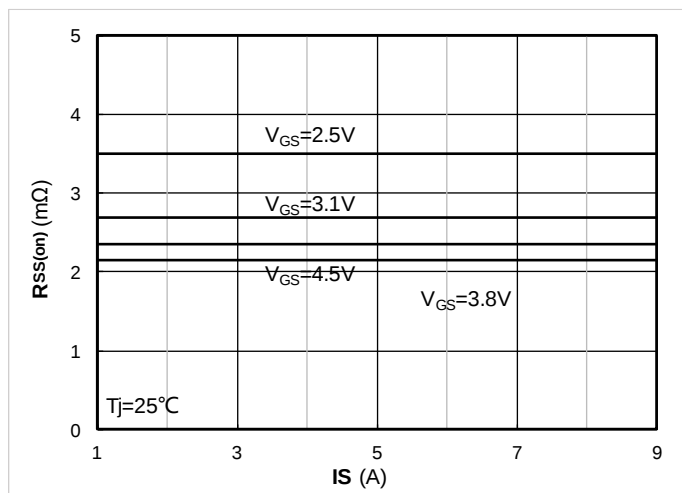


Figure 7. $R_{DS(on)}$ vs. Drain Current; typical values

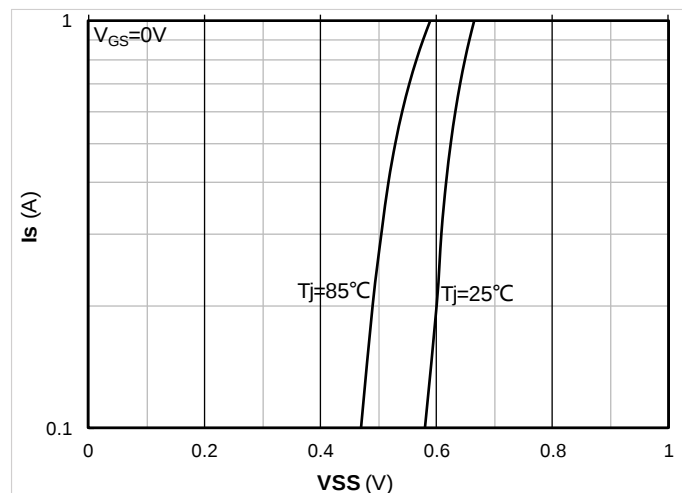


Figure 8. Forward characteristics of reverse diode; typical values

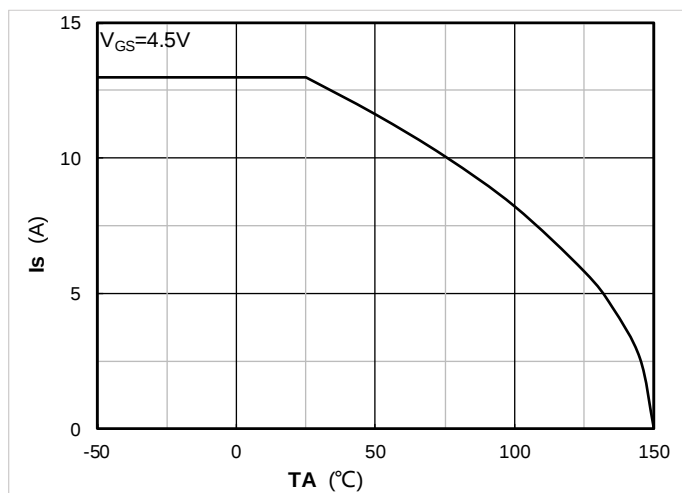


Figure 9. Current dissipation

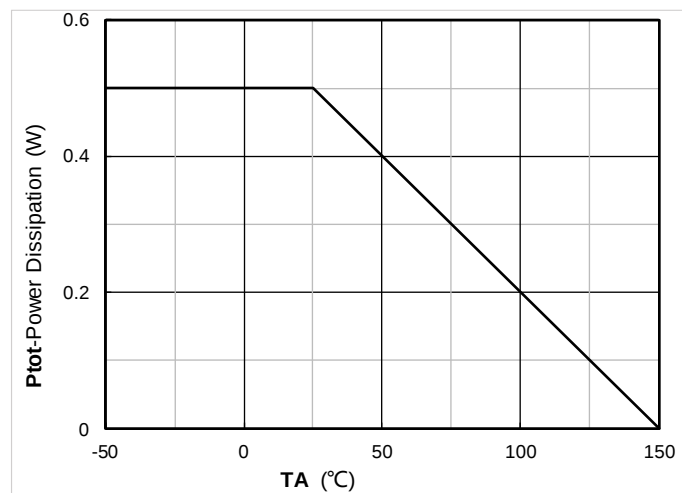


Figure 10. Power dissipation

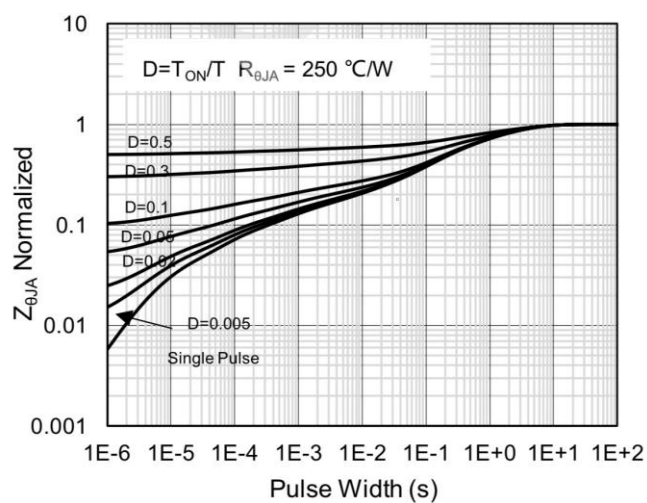


Figure 11. Normalized Maximum Transient Thermal Impedance

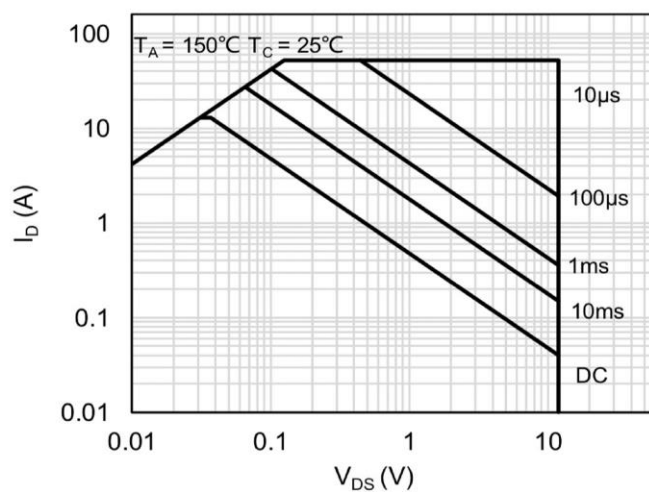


Figure 12. Safe Operation Area

■ Test Circuits & Waveforms

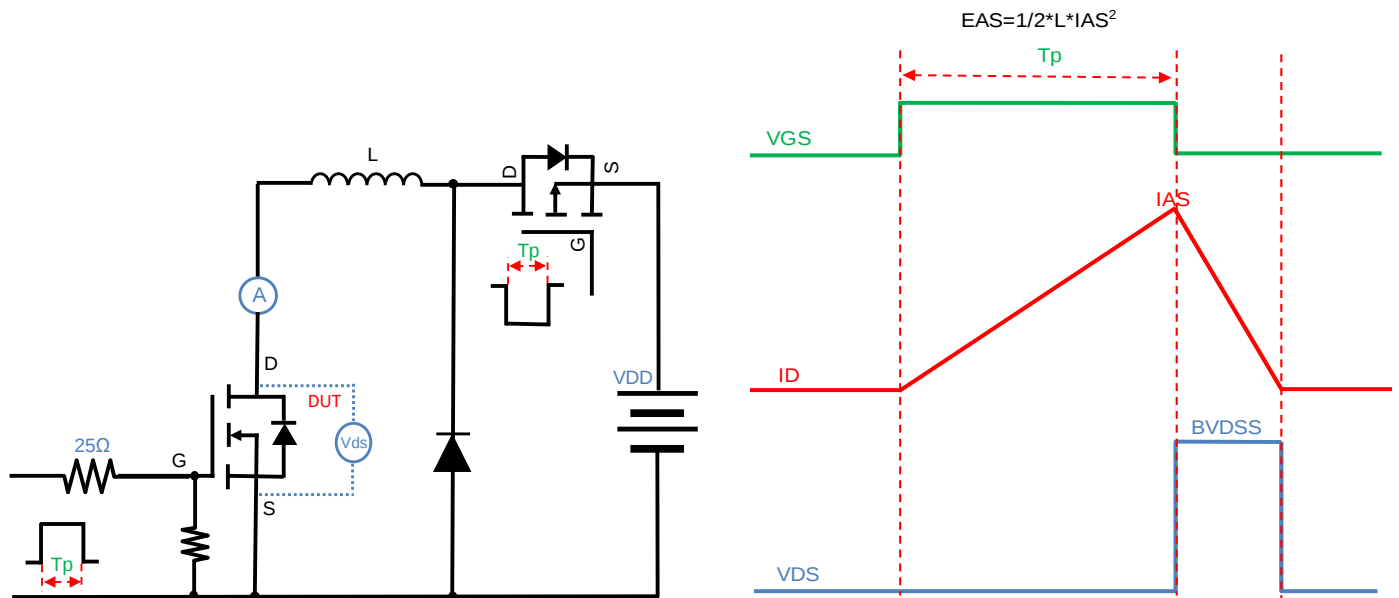


Figure A. Unclamped Inductive Switching (UIS) Test Circuit & Waveform

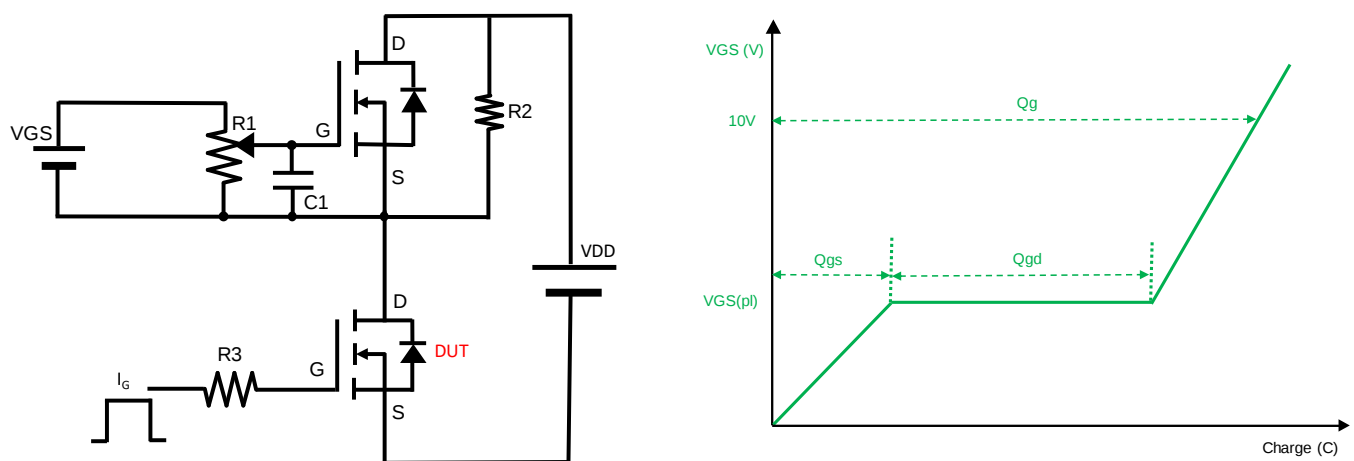


Figure B. Gate Charge Test Circuit & Waveform

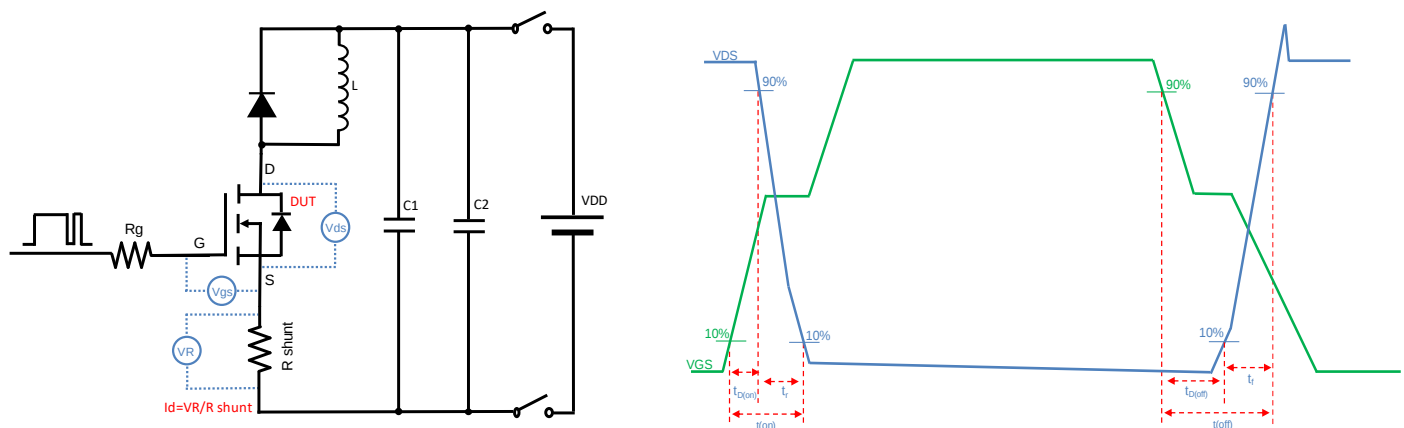


Figure C. Resistive Switching Test Circuit & Waveform

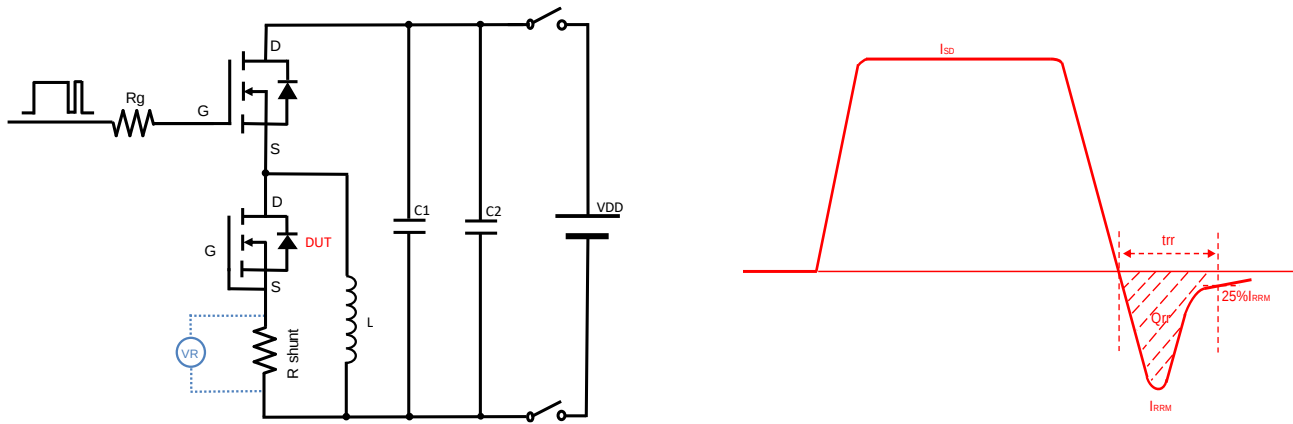
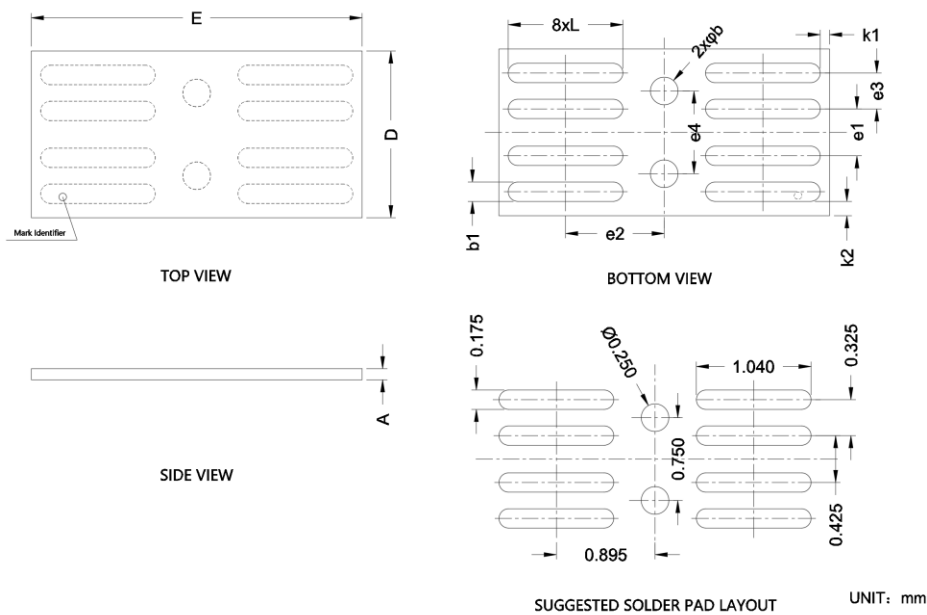


Figure D. Diode Recovery Test Circuit & Waveform



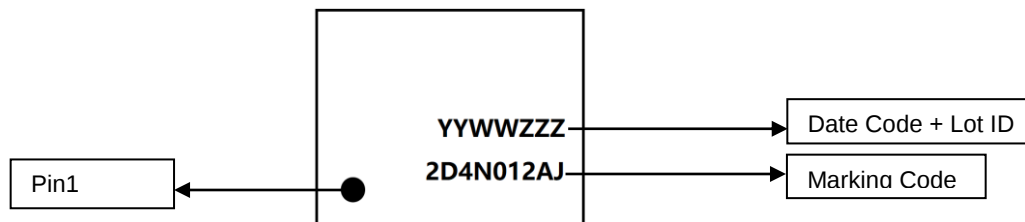
YJZ2D4N012AJ

■ WLCSP-10L Package information



SYMBOL	DIMENSIONS			
	INCHES		Millimeter	
	MIN.	MAX.	MIN.	MAX.
A	0.0041	0.0065	0.105	0.165
b	0.0098TYP.		0.250TYP.	
b1	0.0069TYP.		0.175TYP.	
D	0.0575	0.0614	1.460	1.560
E	0.1161	0.1201	2.950	3.050
e1	0.0167TYP.		0.425TYP.	
e2	0.0352TYP.		0.895TYP.	
e3	0.0128TYP.		0.325TYP.	
e4	0.0295TYP.		0.750TYP.	
L	0.0409TYP.		1.040TYP.	
k1	0.0033TYP.		0.085TYP.	
k2	0.0051TYP.		0.130TYP.	

■ Marking Information



Note:

1. All marking is at middle of the product body
2. All marking is in laser printing
3. 2D4N012AJ is marking code, YYWWZZZ is date code&Lot ID, "YY" is year, "WW" is week, "ZZZ" is Lot ID
4. Body color: Black



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