

12V Dual N-Channel MOSFET

Features

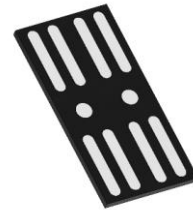
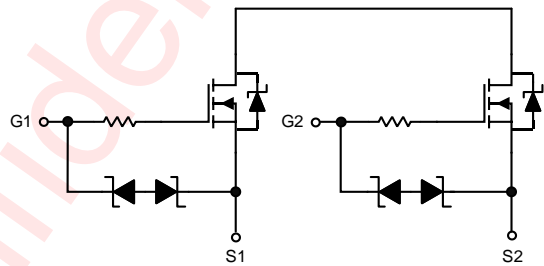
- Low source-source on resistance
- $R_{SS(ON)}$ Typ.= 2.20mΩ ($V_{GS}= 4.5V$)
- Common-Drain type
- ESD Diode-Protected Gate
- 2kV ESD HBM
- Pb-Free, Halogen Free and RoHS compliance
- Applications
- WLCSP 2.98mmX1.49mmX0.11mm-10L

Applications

- Battery protection switch
- Mobile device battery charging and discharging

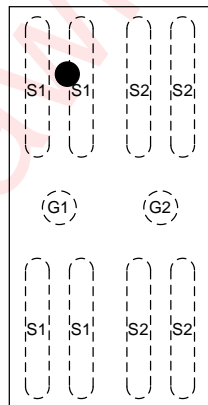
General Description

V_{SS}	$R_{SS(ON)}$ Max.
12V	2.95 mΩ @ $V_{GS}= 4.5V$
	3.35 mΩ @ $V_{GS}= 3.8V$
	4.20 mΩ @ $V_{GS}= 3.1V$
	6.10 mΩ @ $V_{GS}= 2.5V$

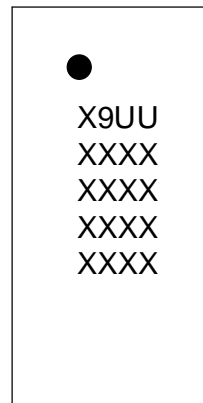


Pin Configuration and Top Mark

AW401005SQCSR
(Top View)



AW401005SQCSR Marking
(Top View)



X9UU---AW401005SQCSR
XXXX/XXXX/XXXX/XXXX---Production tracing code

Ordering Information

Part Number	Package	Marking	Moisture Sensitivity Level	Environmental Information	Delivery Form
AW401005SQCSR	WLCSP 2.98mmX1.49mm X0.11mm-10L	X9UU	MSL1	RoHS+HF	3000 units/ Tape and Reel

Absolute Maximum Ratings ^(NOTE 1)

T_A= 25°C unless otherwise noted

Symbol	Parameter	Maximum	Unit
V _{SS}	Source-Source Voltage	12	V
V _{GS}	Gate-Source Voltage	±8	V
I _S	Source Current (DC) ^(NOTE 2)	23	A
I _{SM}	Source Current (Pulse) ^(NOTE 3)	92	A
P _D	Power Dissipation ^(NOTE 2)	2.3	W
T _J	Operating Junction Temperature	-55 to 150	°C
T _{STG}	Storage Temperature	-55 to 150	°C
V _{ESD}	Human Body Model ^(NOTE 5)	±2	kV

Thermal Information

Symbol	Parameter	Condition	Value	Unit
R _{θJA}	Maximum Junction to Ambient ^(NOTE 2,4)	Steady-State	52.9	°C/W

NOTE1: Conditions out of those ranges listed in "absolute maximum ratings" may cause permanent damages to the device. In spite of the limits above, functional operation conditions of the device should within the ranges listed in "recommended operating conditions". Exposure to absolute-maximum-rated conditions for prolonged periods may affect device reliability.

NOTE2: Mounted on FR-4 material with 1inch², 2oz. Copper.

NOTE3: PW < 10μs pulses, duty cycle 1% max.

NOTE4: Thermal resistance from junction to ambient is highly dependent on PCB layout.

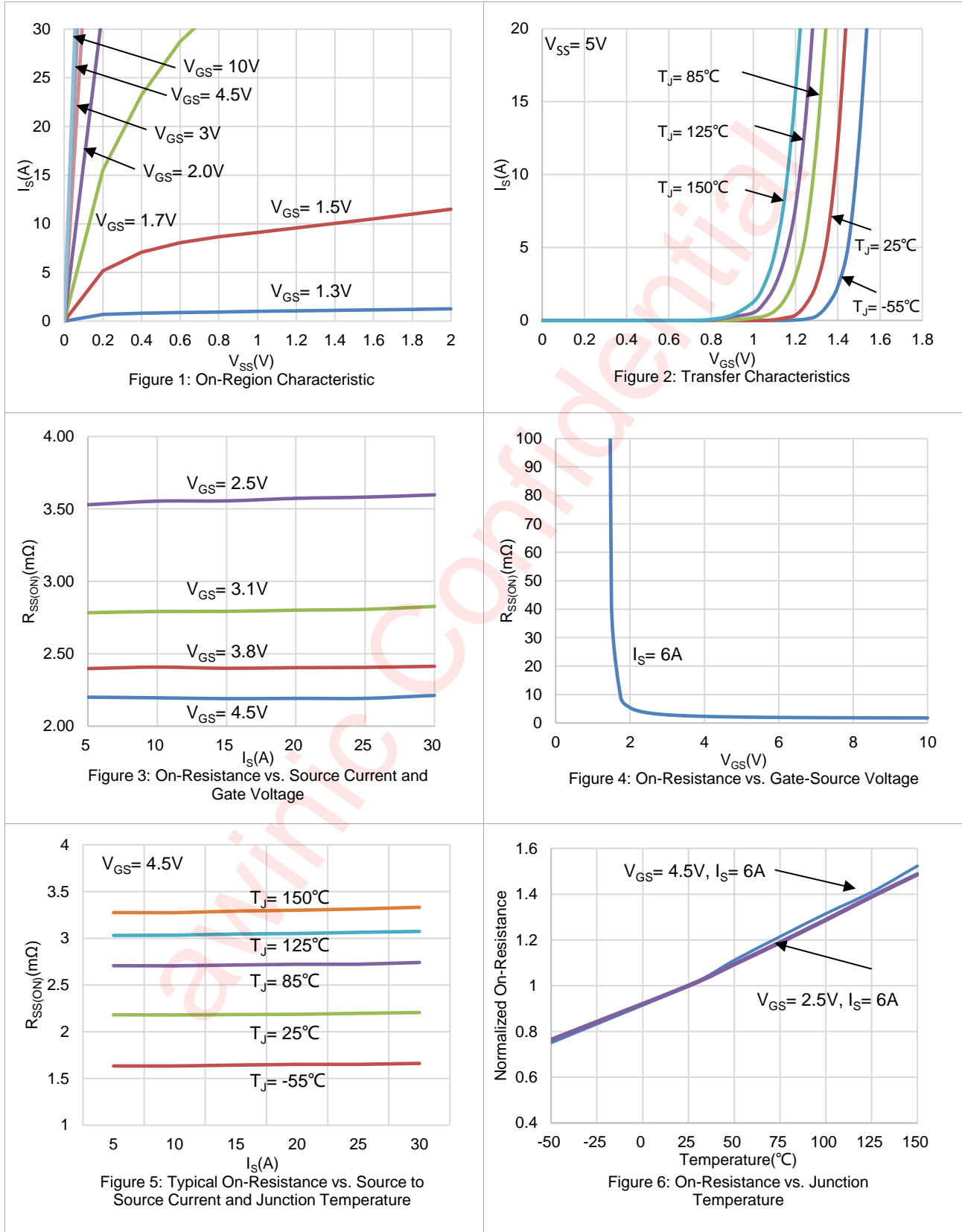
NOTE5: HBM Standards: ESDA/JEDEC JS-001-2017.

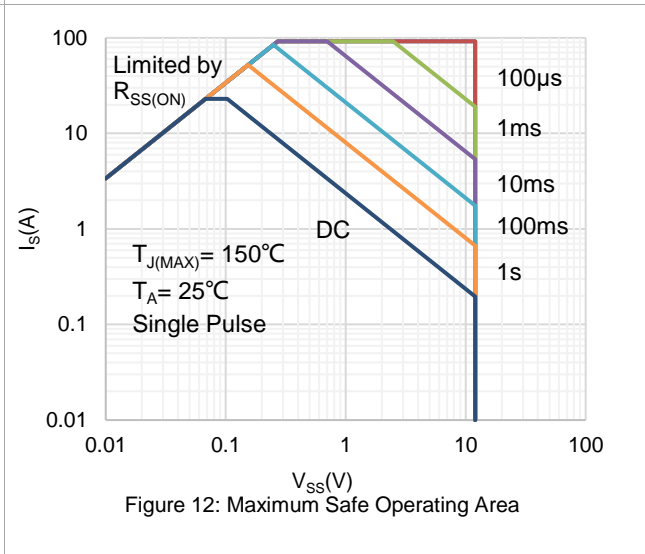
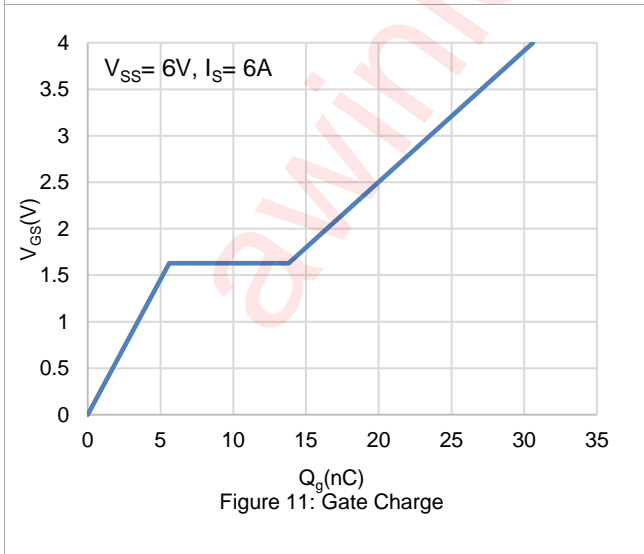
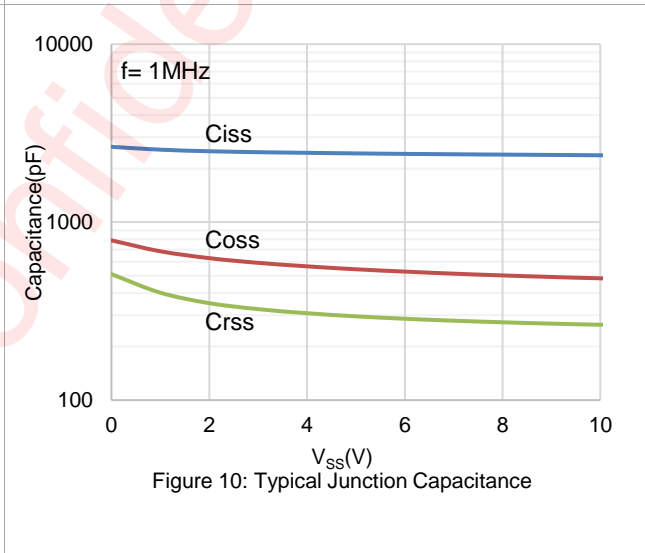
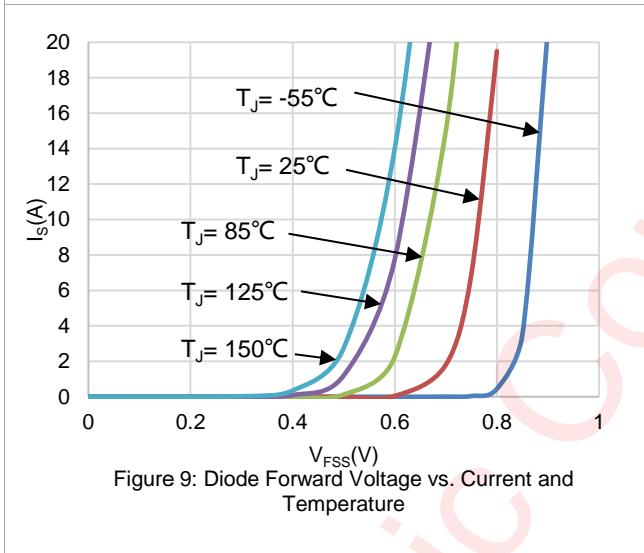
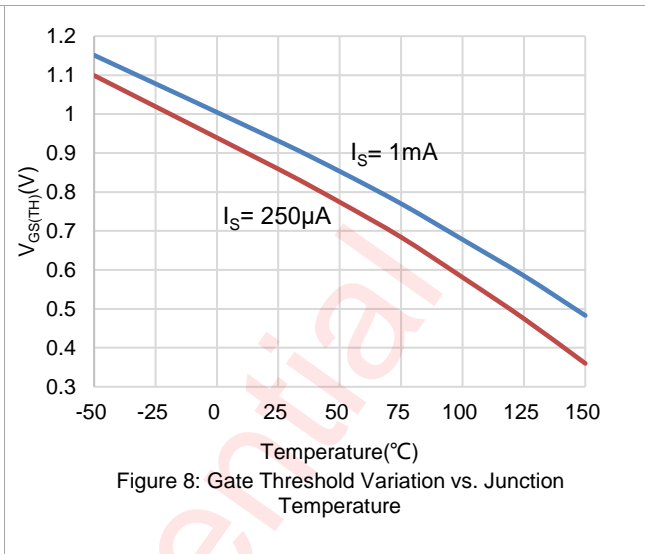
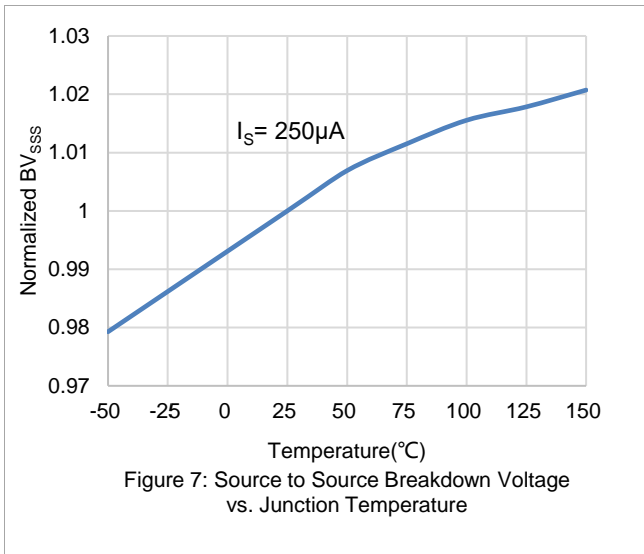
Electrical Characteristics

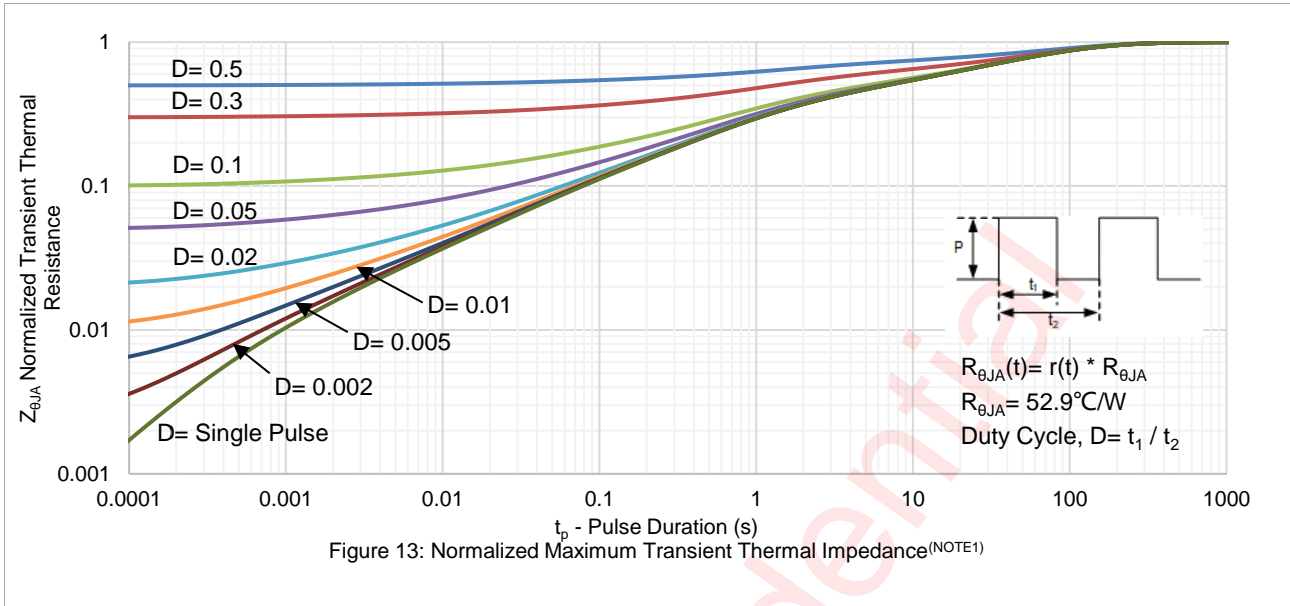
T_J= 25°C for typical values (unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
STATIC PARAMETERS						
BV _{SSS}	Source - Source Breakdown Voltage	I _S = 1mA, V _{GS} = 0V ^(Test Circuit 1)	12	-	-	V
I _{SSS}	Zero Gate Voltage Source Current	V _{SS} = 12V, V _{GS} = 0V ^(Test Circuit 1)	-	-	1	μA
I _{GSS}	Gate Leakage Current	V _{SS} = 0V, V _{GS} = ±8V ^(Test Circuit 2)	-	-	±10	μA
V _{GS(TH)}	Gate Threshold Voltage	V _{SS} = V _{GS} , I _S = 250μA ^(Test Circuit 3)	0.5	0.85	1.4	V
R _{SS(ON)}	Static Source to Source On-Resistance	V _{GS} = 4.5V, I _S = 6A ^(Test Circuit 4)	1.55	2.20	2.95	mΩ
		V _{GS} = 3.8V, I _S = 6A ^(Test Circuit 4)	1.60	2.50	3.35	mΩ
		V _{GS} = 3.1V, I _S = 6A ^(Test Circuit 4)	1.70	2.80	4.20	mΩ
		V _{GS} = 2.5V, I _S = 6A ^(Test Circuit 4)	1.90	3.60	6.10	mΩ
V _{FSS}	Forward Source to Source Voltage	I _S = 6A, V _{GS} = 0V ^(Test Circuit 5)	-	0.7	1.2	V
DYNAMIC PARAMETERS						
R _g	Series Gate Resistance	f= 1MHz	-	310	-	Ω
C _{iss}	Input Capacitance	V _{GS} = 0V, V _{SS} = 10V, f= 1MHz	-	2376	-	pF
C _{oss}	Output Capacitance		-	484	-	pF
C _{rss}	Reverse Transfer Capacitance		-	265	-	pF
SWITCHING PARAMETERS						
Q _g	Total Gate Charge	V _{GS} = 0 to 4V, V _{SS} = 6V, I _S = 6A ^(Test Circuit 6)	-	30.6	-	nC
Q _{gs}	Gate Source Charge		-	5.6	-	nC
Q _{gd}	Gate Drain Charge		-	8.2	-	nC
Q _{g(th)}	Gate Charge at V _{GS(TH)}		-	2.9	-	nC
t _{d(on)}	Turn - On Delay Time	V _{GS} = 0 to 4V, V _{SS} = 6V, R _G = 3Ω, I _S = 6A ^(Test Circuit 7)	-	561	-	ns
t _r	Turn - On Rise Time		-	1058	-	ns
t _{d(off)}	Turn - Off Delay Time	V _{GS} = 4 to 0 V, V _{SS} = 6V, R _G = 3Ω, I _S = 6A ^(Test Circuit 7)	-	1612	-	ns
t _f	Turn - Off Fall Time		-	1854	-	ns

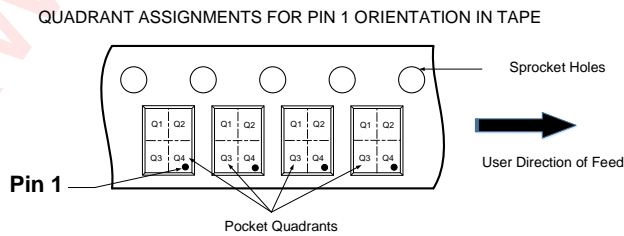
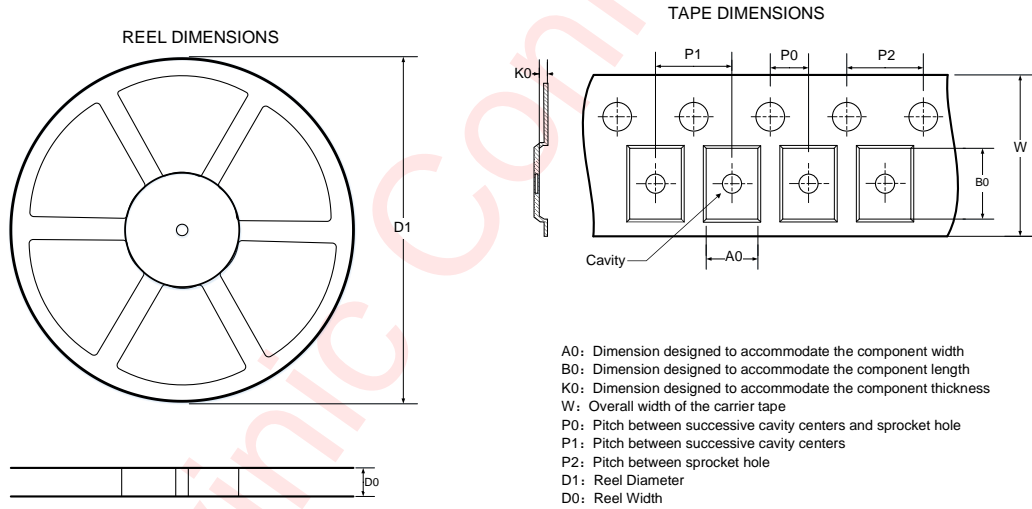
Typical Electrical and Thermal Characteristics







Tape And Reel Information



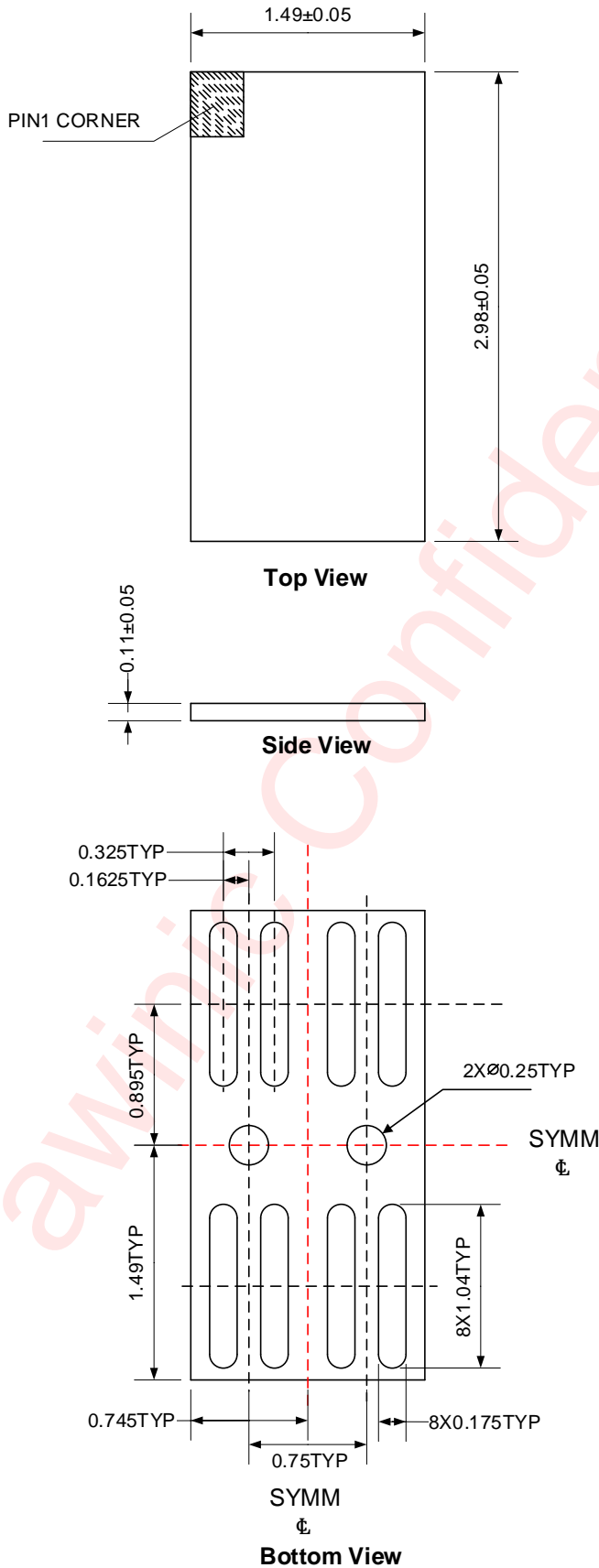
Note: The above picture is for reference only. Please refer to the value in the table below for the actual size

DIMENSIONS AND PIN1 ORIENTATION

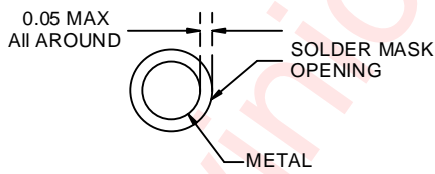
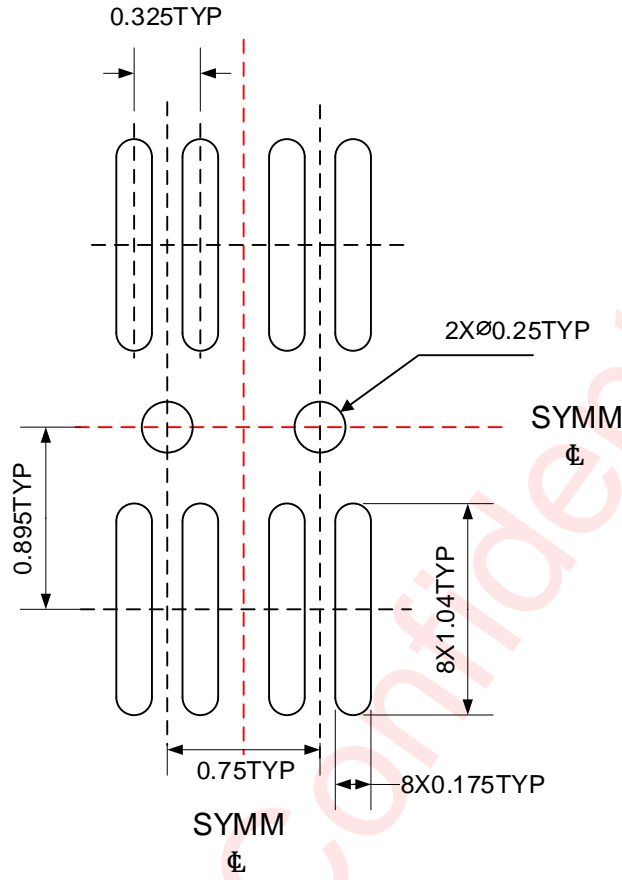
D1 (mm)	D0 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
178	12	1.61	3.1	0.22	2	4	4	12	Q4

All dimensions are nominal

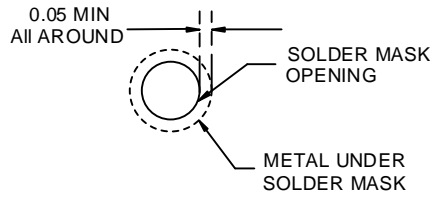
Package Description



Land Pattern Data



NON SOLDER MASK DEFINED

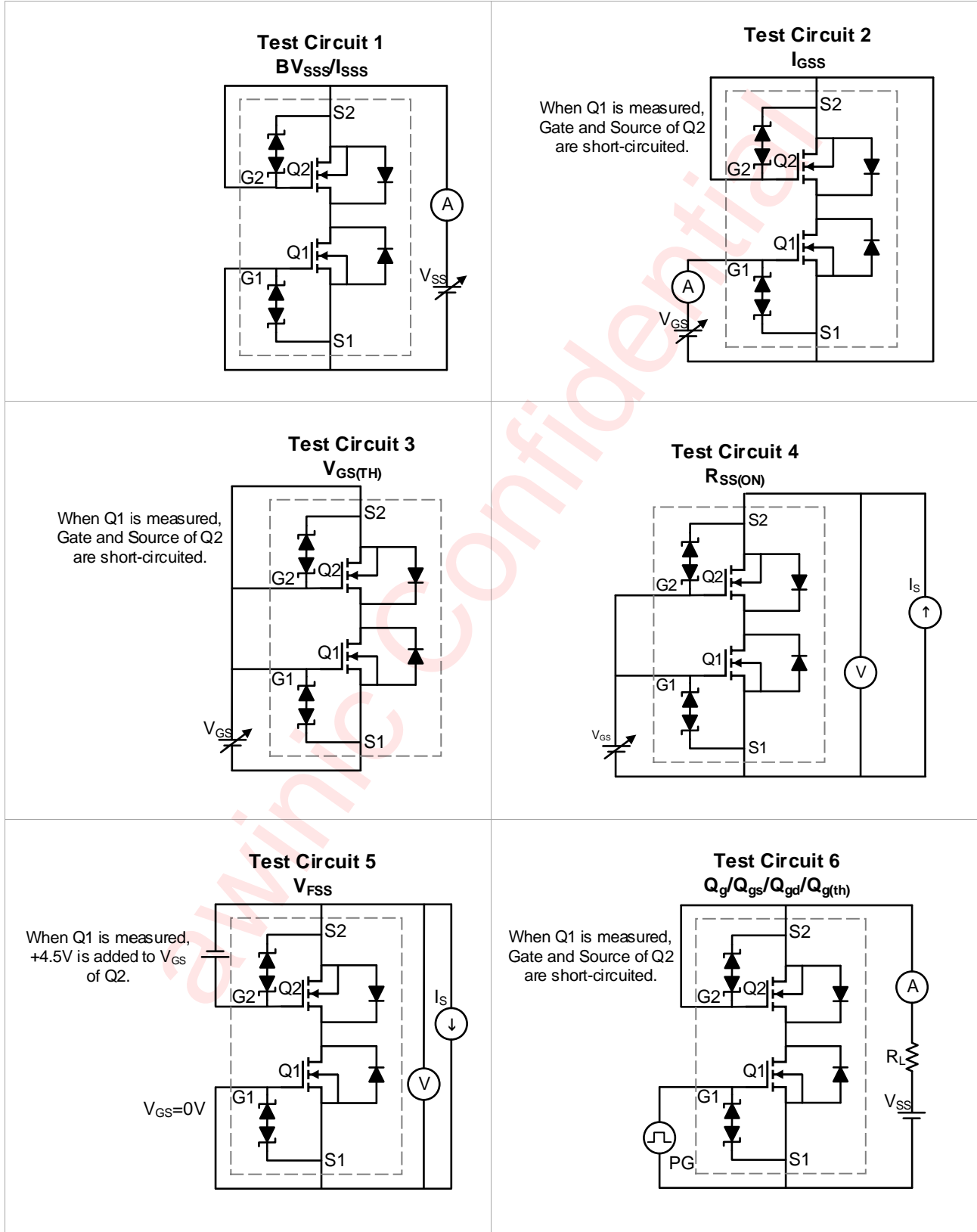


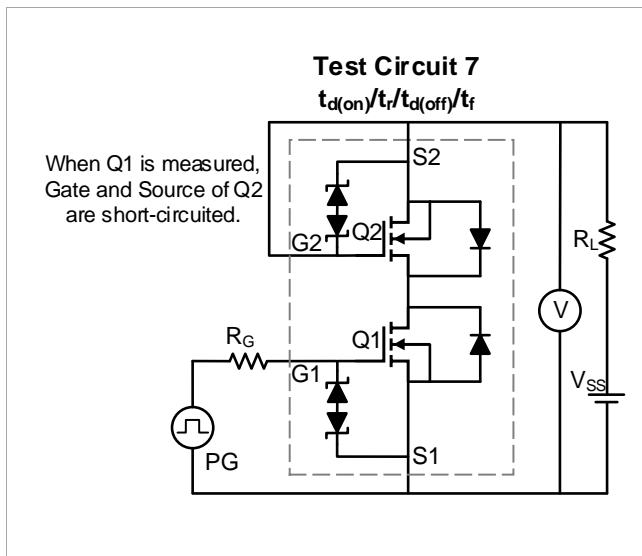
SOLDER MASK DEFINED

Unit: mm

Test Circuits

Q1 and Q2 are both measured. The test circuits are example of measuring Q1.





Revision History

Version	Date	Change Record
V1.0	Aug. 2023	Officially released
V1.1	Dec. 2023	Updated Marking (Page1 and Page2)

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