

30V N-Channel MOSFET

Features

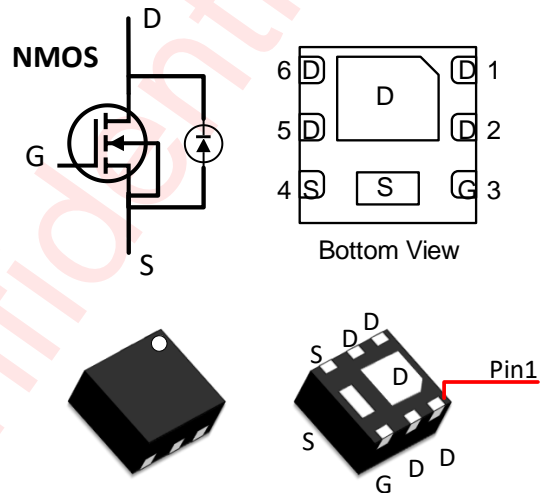
- Low on-state resistance
- RoHS compliant
- 100% UIS tested
- 100% R_g tested
- DFN 2mmX2mmX0.75mm-6L Package

Applications

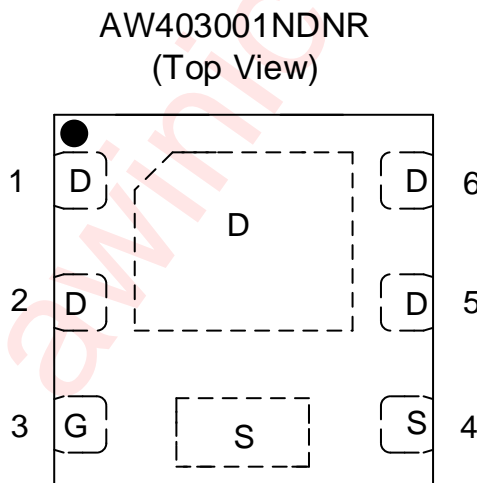
- Motor controllers
- DC-to-DC convertors
- Battery-driven electronic products, electrical equipment and machines

General Description

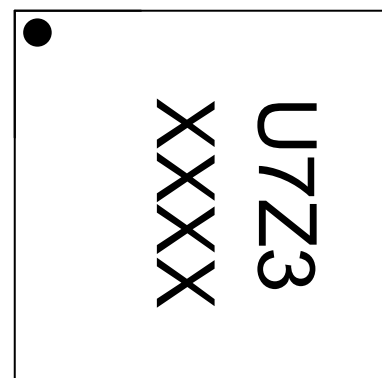
Product Summary	
V _{DS}	30V
R _{DS(ON)}	10.5 mΩ (Typ.)@10V
	12.5 mΩ (Typ.)@4.5V
I _D	12A



Pin Configuration and Top Mark



AW403001NDNR Marking (Top View)



U7Z3-AW403001NDNR
XXXX-Production Tracing Code

Ordering Information

Part Number	Package	Marking	Moisture Sensitivity Level	Environmental Information	Delivery Form
AW403001NDNR	DFN 2mmX2mm-6L	U7Z3	MSL1	RoHS+HF	3000 units/ Tape and Reel

Absolute Maximum Ratings^(NOTE1)

T_A= 25°C unless otherwise noted.

Symbol	Parameter	Maximum	Unit	
V _{DS}	Drain-Source Voltage	30	V	
V _{GS}	Gate-Source Voltage	±20	V	
I _D	Drain Current(DC) ^(NOTE 2, 6)	T _A = 25°C	12	A
		T _A = 75°C	9.3	A
I _{DM}	Drain Current(Pulse) ^(NOTE 3)	90	A	
P _D	Power Dissipation(T _A =25°C) ^(NOTE 2)	2	W	
T _J	Maximum Operating Junction Temperature	150	°C	
T _{STG}	Storage Temperature	-55 to 150	°C	
I _{AS}	Avalanche Current ^(NOTE 5)	21	A	
E _{AS}	Avalanche Energy ^(NOTE 5)	22	mJ	

Thermal Information

Symbol	Parameter	Condition	Value	Unit
R _{θJA}	Maximum Junction to Ambient ^(NOTE 2, 4)	Steady-State	61	°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: Test condition 380μs 25°C.

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

NOTE5: L= 0.1mH, V_{GS}= 10V, R_g= 25Ω, V_{DS}= 15V.

NOTE6: Rated according to R_{θJA}.

Electrical Characteristics

$T_J = 25^\circ\text{C}$ for typical values (unless otherwise noted).

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	30	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 30\text{V}, V_{GS} = 0\text{V}$	-	-	1	μA
I_{GSS}	Gate Leakage Current	$V_{DS} = 0\text{V}, V_{GS} = \pm 20\text{V}$	-	-	± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	-	1.8	2.3	V
$R_{DS(ON)}$	Static Drain to Source On-Resistance	$V_{GS} = 10\text{V}, I_D = 10\text{A}$	-	10.5	13	m Ω
		$V_{GS} = 4.5\text{V}, I_D = 10\text{A}$	-	12.5	15	m Ω
g_{FS}	Forward Transconductance	$V_{DS} = 5\text{V}, I_D = 20\text{A}$	-	60	-	S
V_{SD}	Diode Forward Voltage	$I_S = 1\text{A}, V_{GS} = 0\text{V}$	-	0.7	1	V
DYNAMIC PARAMETERS						
R_g	Gate Resistance	$f = 1\text{MHz}$	-	2.3	-	Ω
C_{iss}	Input Capacitance	$V_{GS} = 0\text{V}, V_{DS} = 15\text{V}, f = 1\text{MHz}$	-	1550	-	pF
C_{oss}	Output Capacitance		-	160	-	pF
C_{rss}	Reverse Transfer Capacitance		-	125	-	pF
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	$V_{GS} = 10\text{V}, V_{DS} = 15\text{V}, I_D = 20\text{A}$	-	28	-	nC
Q_{gs}	Gate Source Charge		-	5.4	-	nC
Q_{gd}	Gate Drain Charge		-	4.8	-	nC
$t_{D(on)}$	Turn-On Delay Time	$V_{DS} = 15\text{V}, I_D = 20\text{A}, R_g = 3\Omega, V_{GS} = 10\text{V}$	-	10	-	ns
t_r	Turn-On Rise Time		-	7	-	ns
$t_{D(off)}$	Turn-Off Delay Time		-	36	-	ns
t_f	Turn-Off Fall Time		-	12	-	ns
t_{rr}	Body Diode Reverse Recovery Time	$I_D = 10\text{A}, di/dt = 100\text{A}/\mu\text{s}$	-	24	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_D = 10\text{A}, di/dt = 100\text{A}/\mu\text{s}$	-	30	-	nC

Typical Electrical and Thermal Characteristics

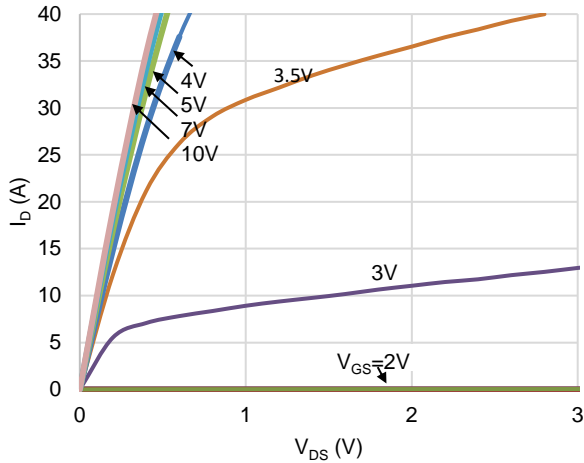


Figure 1: On-Region Characteristics

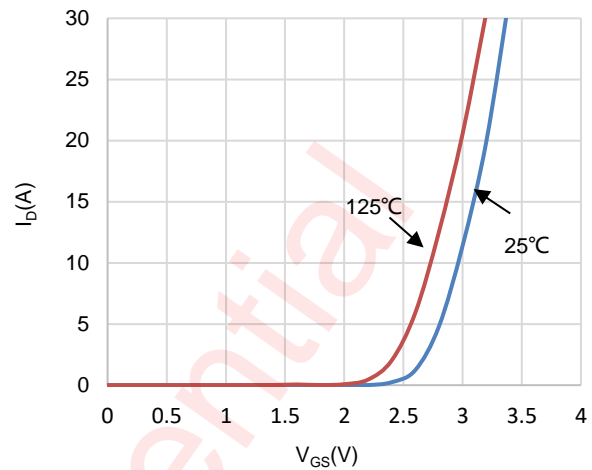


Figure 2: Transfer Characteristics

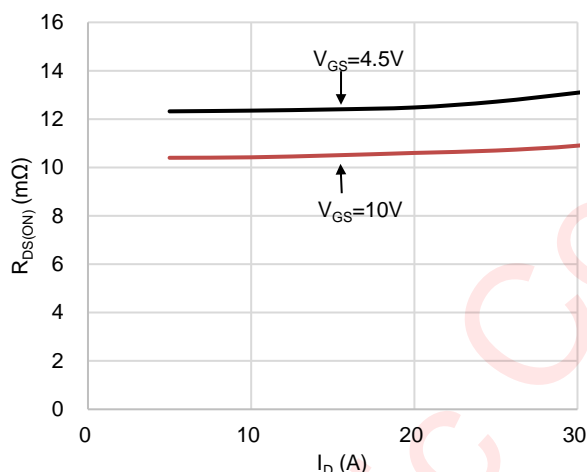


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

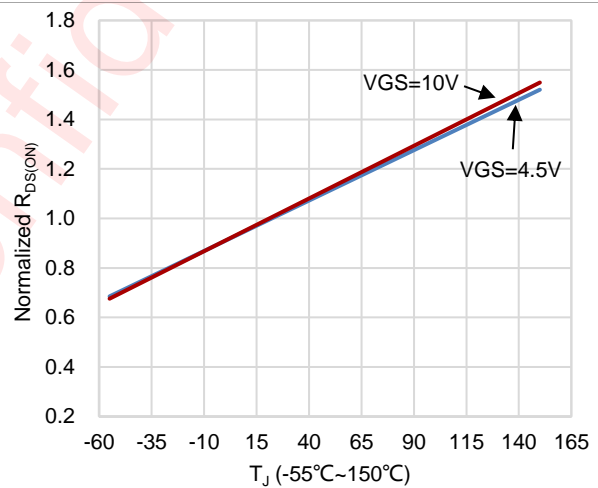


Figure 4: On-Resistance vs. Junction Temperature

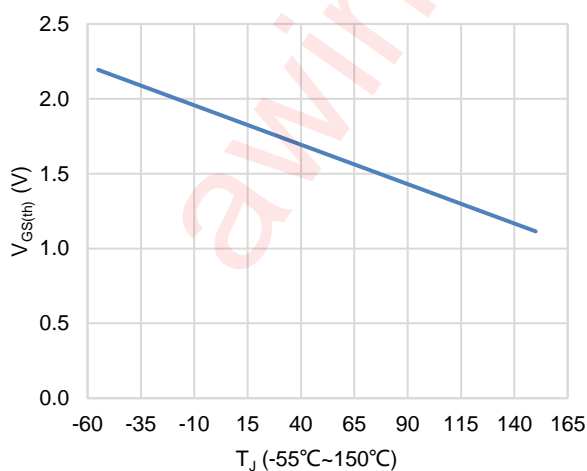


Figure 5: Gate Threshold Voltage vs. Junction Temperature

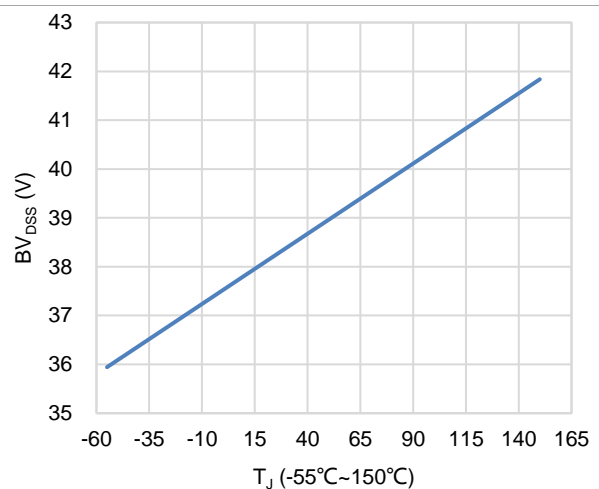


Figure 6: Drain-Source Breakdown Voltage vs. Junction Temperature

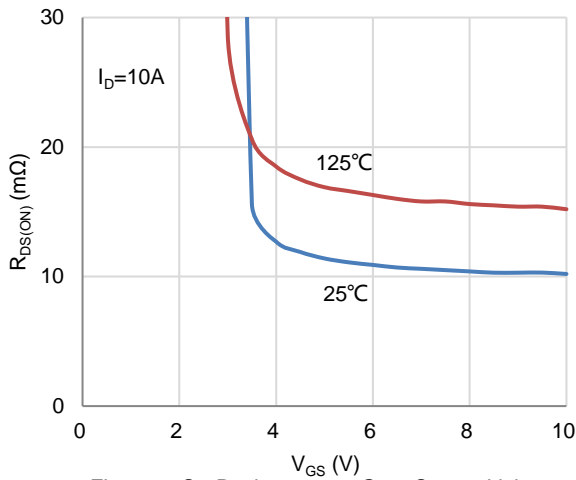


Figure 7: On-Resistance vs. Gate-Source Voltage

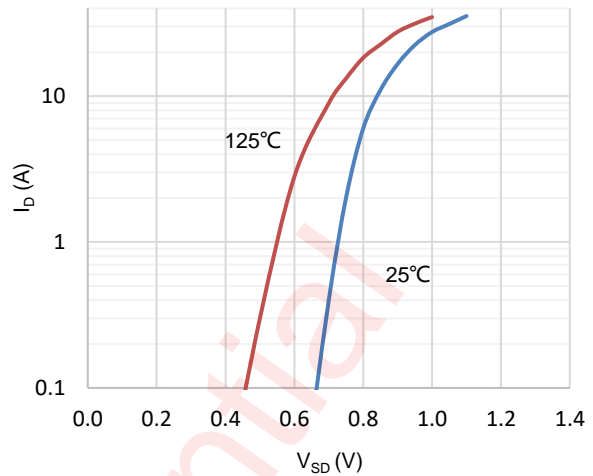


Figure 8: Forward Source to Drain Characteristics

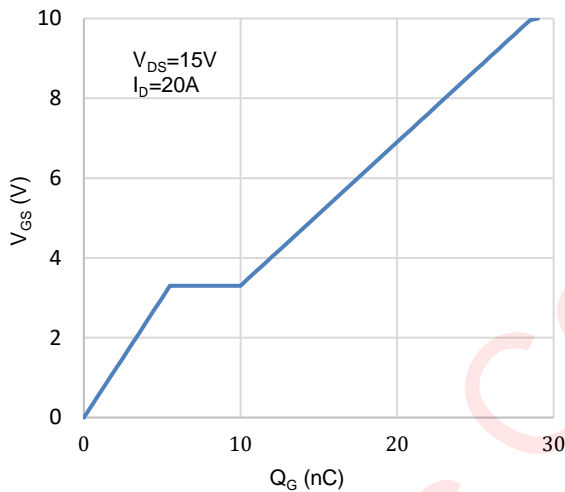


Figure 9: Gate-Charge Characteristics

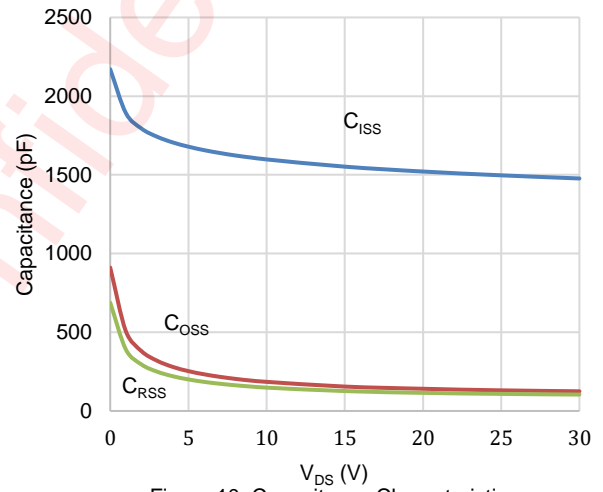


Figure 10: Capacitance Characteristics

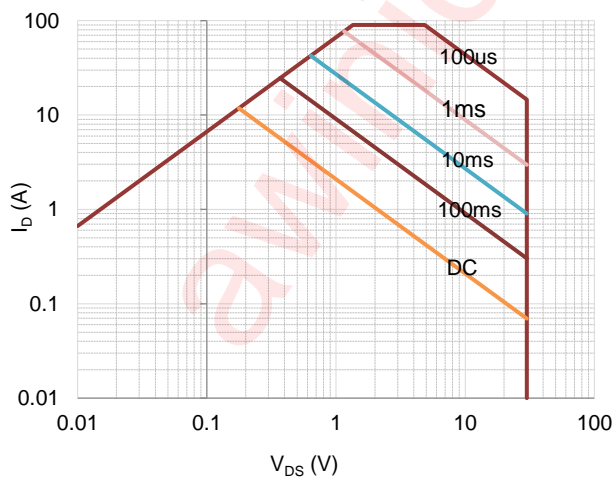


Figure 11: Maximum Forward Biased Safe Operating Area

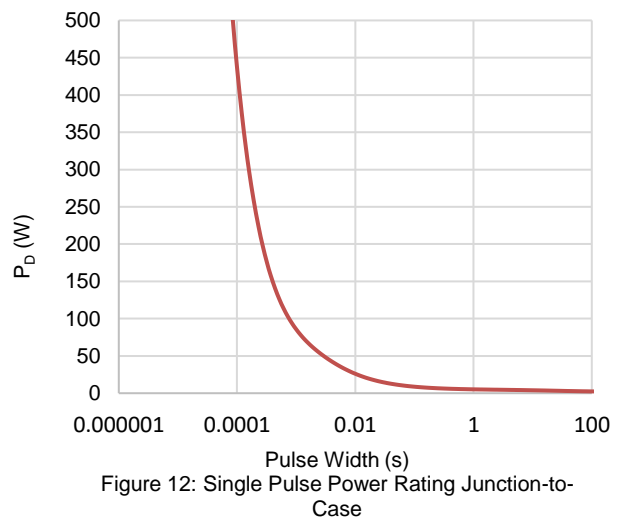
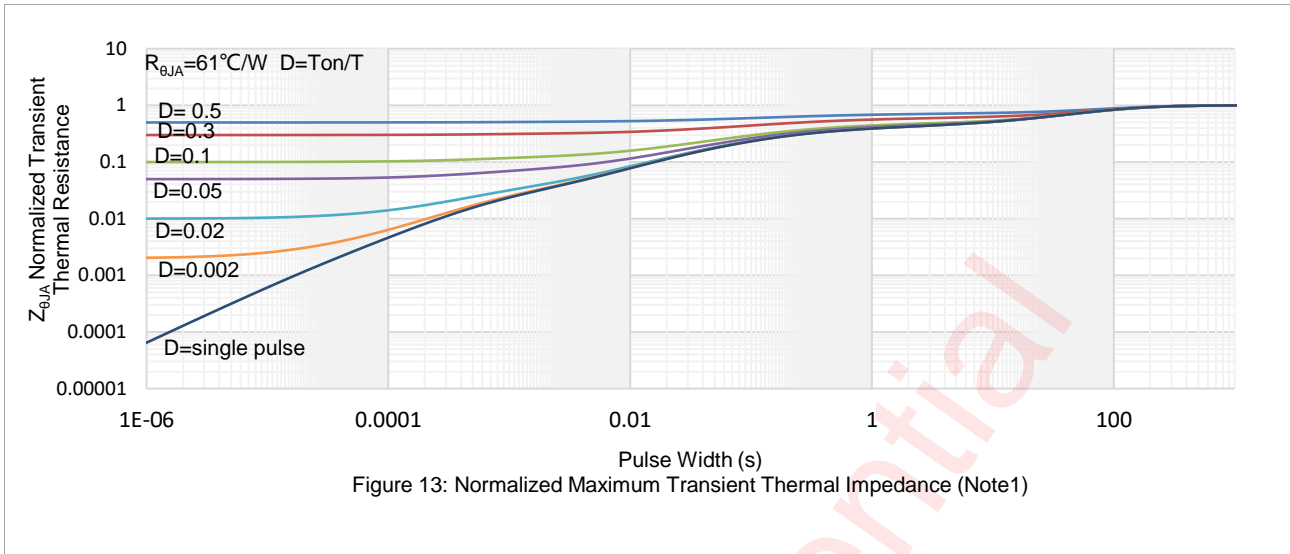
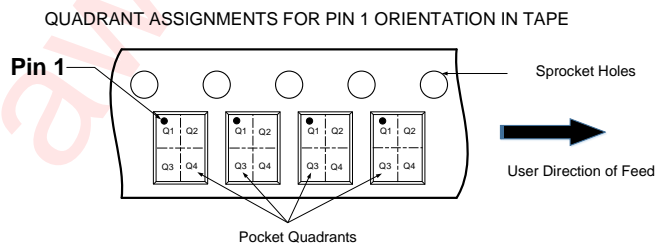
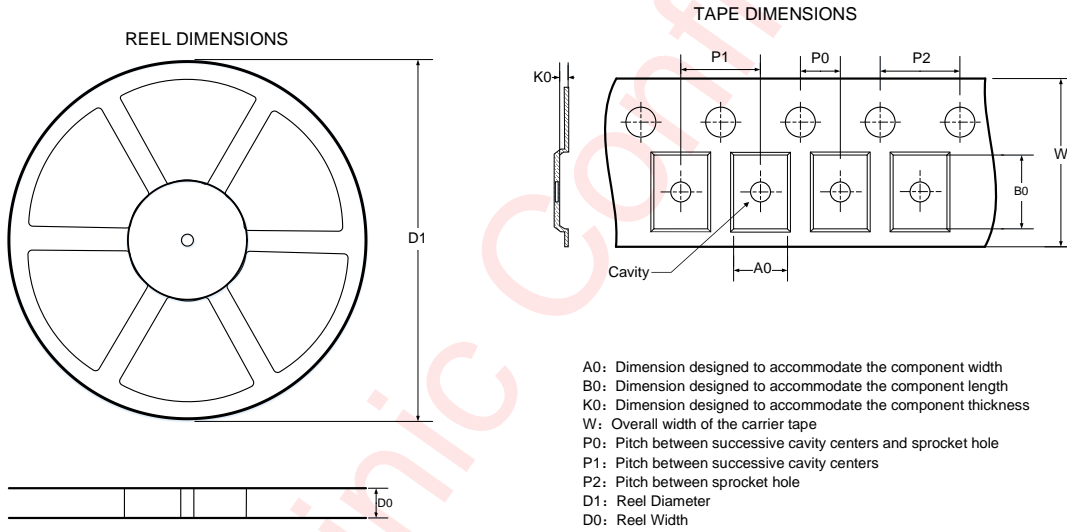


Figure 12: Single Pulse Power Rating Junction-to-Case



Tape And Reel Information

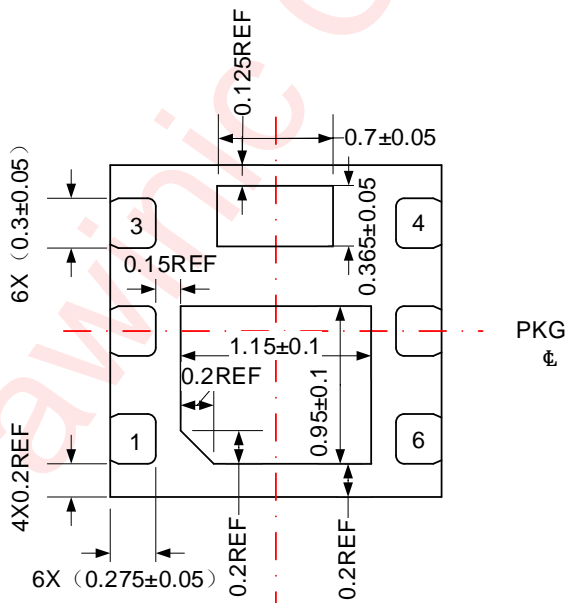
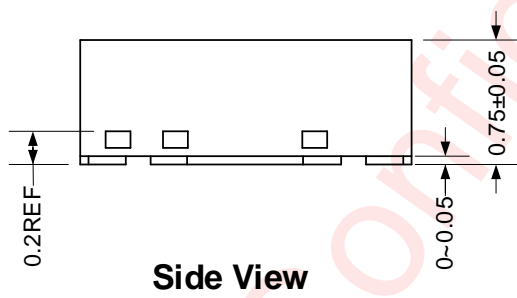
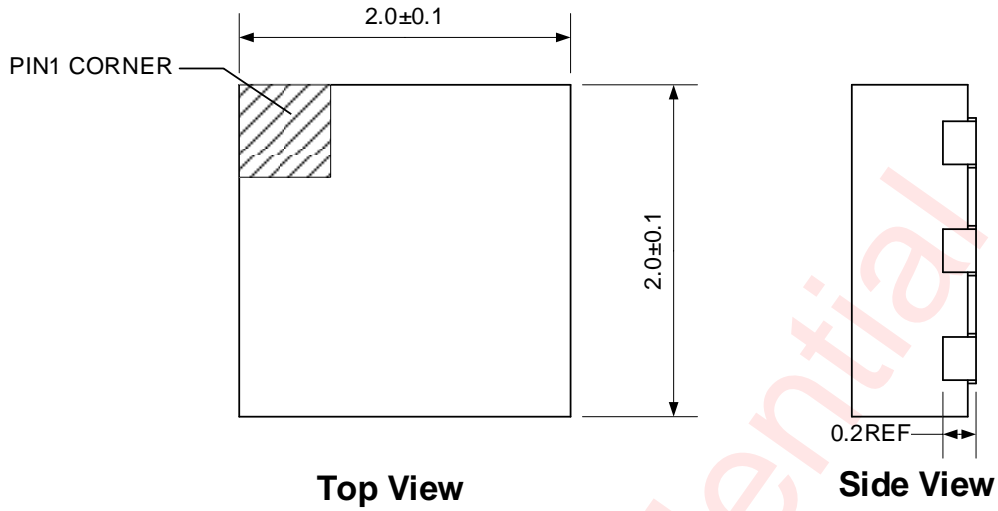


Note: The above picture is for reference only. Please refer to the value in the table below for the actual size

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	8.4	2.3	2.3	1	2	4	4	8	Q1

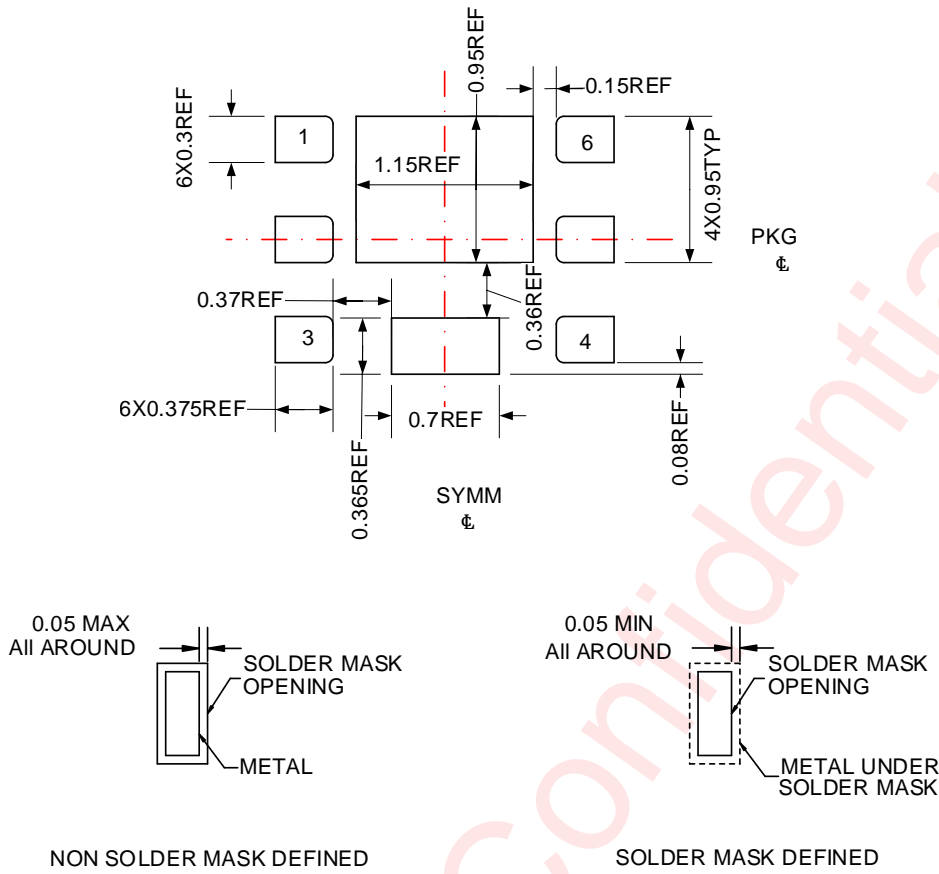
All dimensions are nominal

Package Description



Unit: mm

Land Pattern Data



Unit: mm

Revision History

Version	Date	Change Record
V0.9	Mar 2021	Draft released
V1.0	Nov 2021	Update Q_g Typical value
V1.1	Jan. 2022	Update $R_{DS(ON)}$ Typical and Maximum value
V1.2	Aug. 2022	Add Figure 6: BV_{DSS} vs T_J , Figure 5: $V_{GS(th)}$ vs T_J ; Update Figure 4: R_{dson} vs T_J Temperature Range;

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