30V N-Channel MOSFET

FEATURES

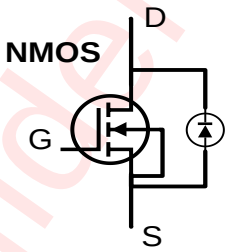
- Low on-state resistance
- HF/RoHS compliant
- 100% UIS tested
- 100% R_g tested
- DFN 2mmX2mmX0.75mm-6L Package

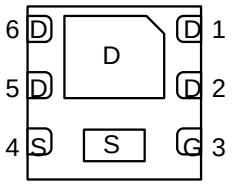
APPLICATIONS

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

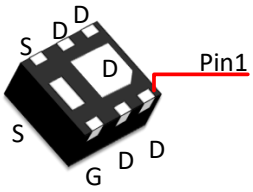
GENERAL DESCRIPTION

Product Summary	
V_{DS}	30V
$R_{DS(ON)}$	4.7 mΩ (Typ.)@V_{GS}= 10V
	6.3 mΩ (Typ.)@V_{GS}= 4.5V
I_D	15.4A



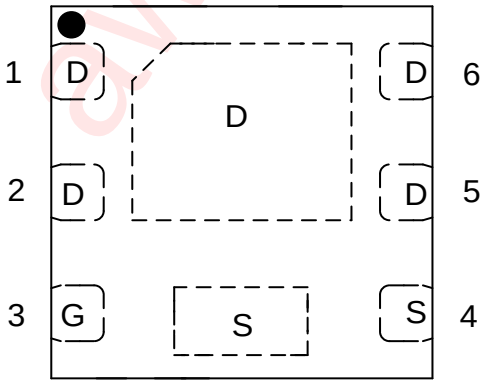


Bottom View

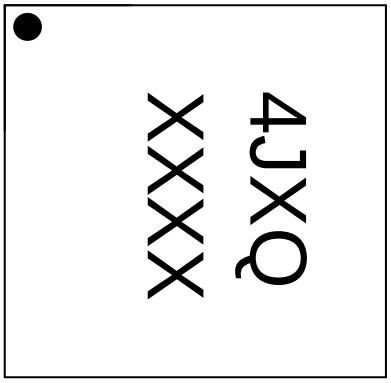


PIN CONFIGURATION AND TOP MARK

AW403002NDNR
(Top View)



AW403002NDNR Marking
(Top View)



4JXQ-AW403002NDNR
XXXX-Production Tracing Code

ORDERING INFORMATION

Part Number	Package	Marking	Moisture Sensitivity Level	Environmental Information	Delivery Form
AW403002NDNR	DFN 2mmX2mmX0.75mm-6L	4JXQ	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	15.4	A
		T_A=75°C	13.2	A
I_{DM}	Drain Current (Pulse) (NOTE 3)		150	A
P_D	Power Dissipation (T_A=25°C) (NOTE2)		2.23	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
$R_{\theta JA}$	Maximum Junction to Ambient (NOTE 2, 4)	Steady-State	56	°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 1inch^2, 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 $R_{\theta JA}$.

ELECTRICAL CHARACTERISTICS

T_J= 25°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= 250μA, V_{GS}= 0V	30			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}= 30V, V_{GS}= 0V			1	μA
I_{GSS}	Gate Leakage Current	V_{DS}= 0V, V_{GS}= ±20V			±100	nA
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS}= V_{GS}, I_D= 250μA	1.1	1.8	2.3	V
$R_{DS(ON)}$	Static Source to Source On-Resistance	V_{GS}= 10V, I_D= 10A		4.7	6	mΩ
		V_{GS}= 4.5V, I_D= 10A		6.3	7.5	mΩ
g_{FS}	Forward Transconductance	V_{DS}= 5V, I_D= 20A		60		S
V_{SD}	Diode Forward Voltage	I_S= 1A,V_{GS}= 0V		0.7	1	V
DYNAMIC PARAMETERS						
R_g	Gate Resistance	f= 1MHz		2.3		Ω
C_{iss}	Input Capacitance	V_{GS}= 0V, V_{DS}= 15V, f= 1MHz		1550		pF
C_{oss}	Output Capacitance			160		pF
C_{rss}	Reverse Transfer Capacitance			125		pF
SWITCHING PARAMETERS						
Q_g	Total Gate Charge (V_{GS}= 10V)	V_{GS}= 10V, V_{DS}= 15V, I_D= 20A		28.5		nC
Q_g	Total Gate Charge (V_{GS}= 4.5V)			13.8		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}= 15V, I_D= 20A, R_G= 3Ω, V_{GS}= 10V		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= 10A, di/dt= 100A/μs		24		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_D= 10A, di/dt= 100A/μs		30		nC

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

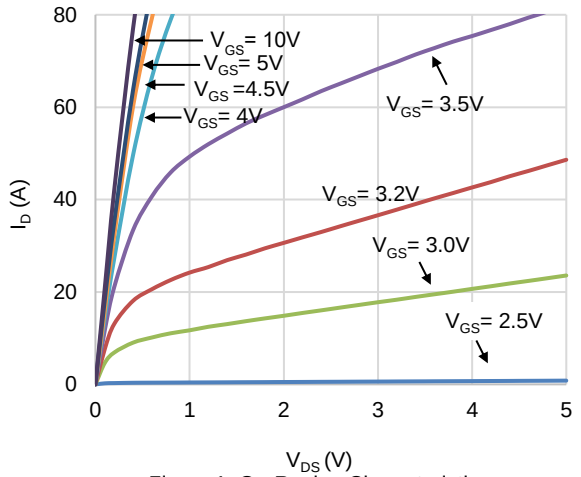


Figure 1: On-Region Characteristics

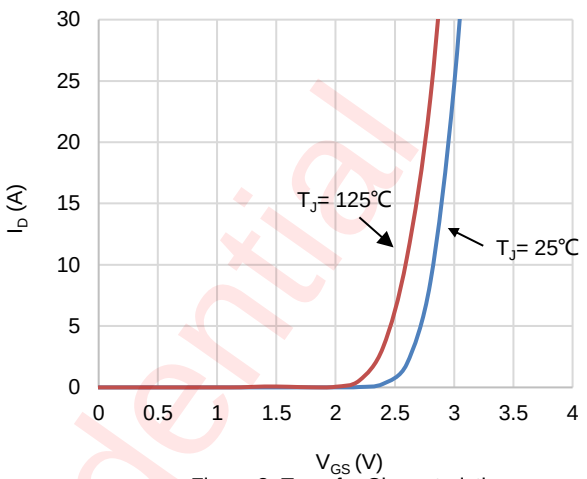


Figure 2: Transfer Characteristics

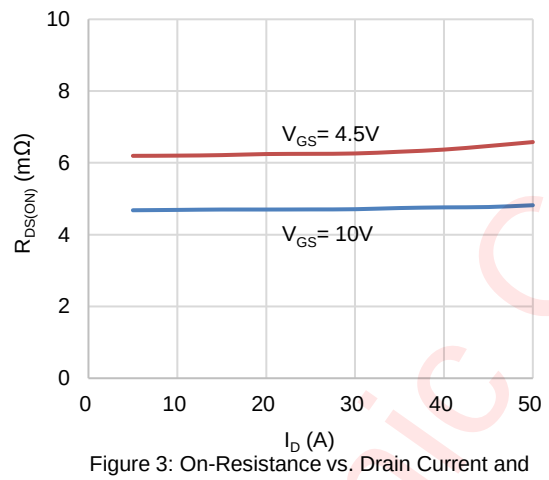


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

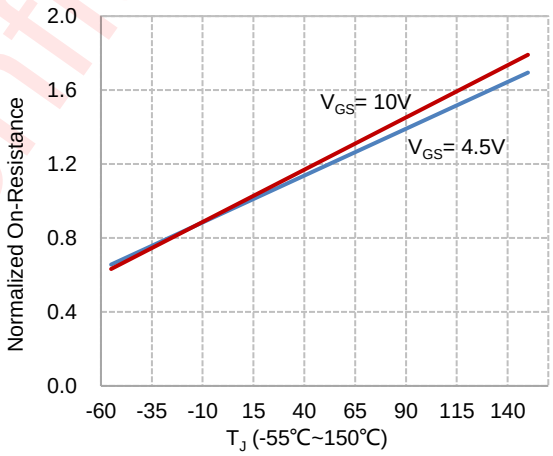


Figure 4: On-Resistance vs. Junction Temperature

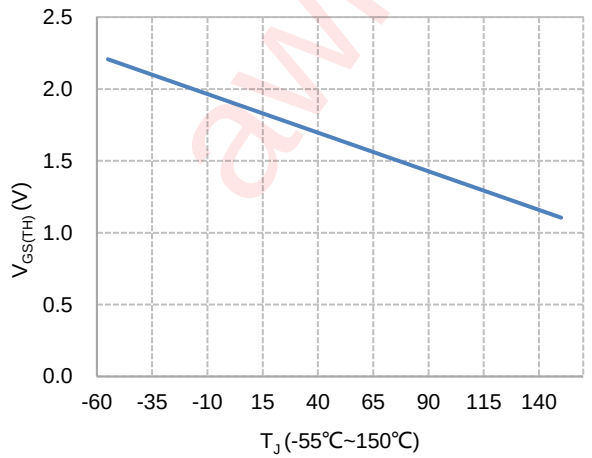


Figure 5: Gate Threshold Voltage vs. Junction Temperature

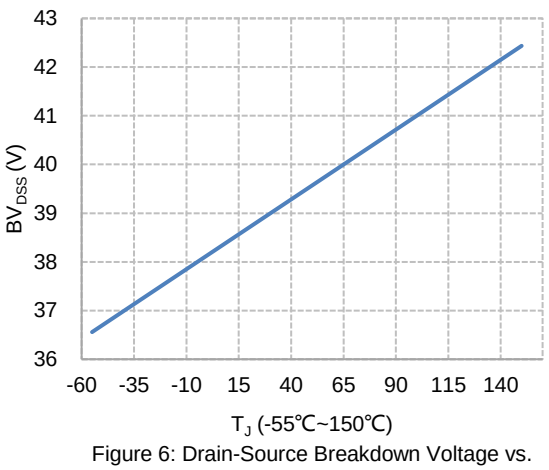


Figure 6: Drain-Source Breakdown Voltage vs. Junction Temperature

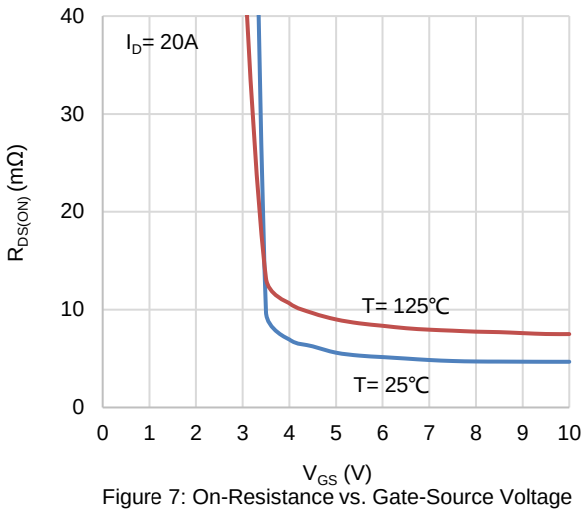


Figure 7: On-Resistance vs. Gate-Source Voltage

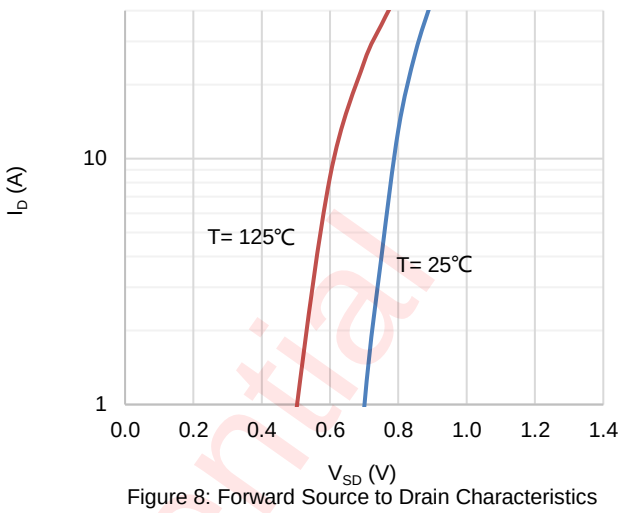


Figure 8: Forward Source to Drain Characteristics

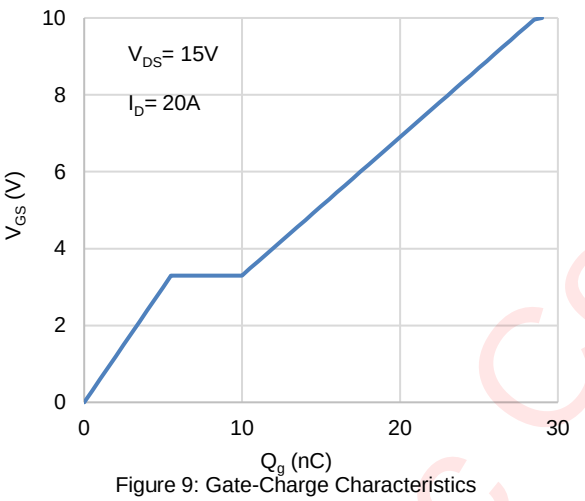


Figure 9: Gate-Charge Characteristics

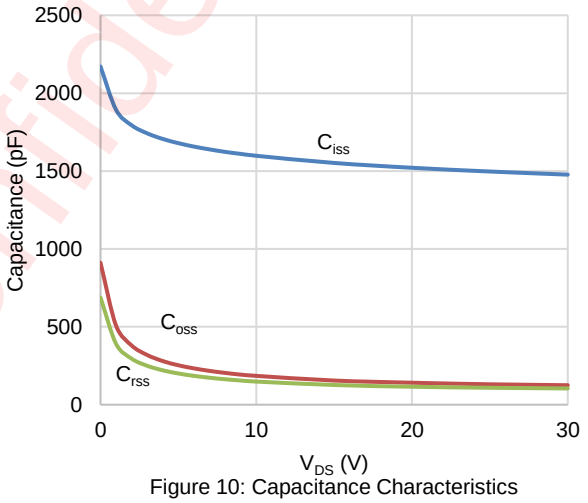


Figure 10: Capacitance Characteristics

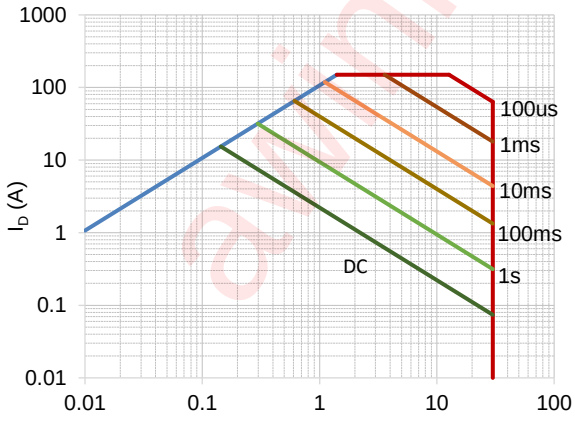


Figure 11: Maximum Forward Biased Safe Operating Area

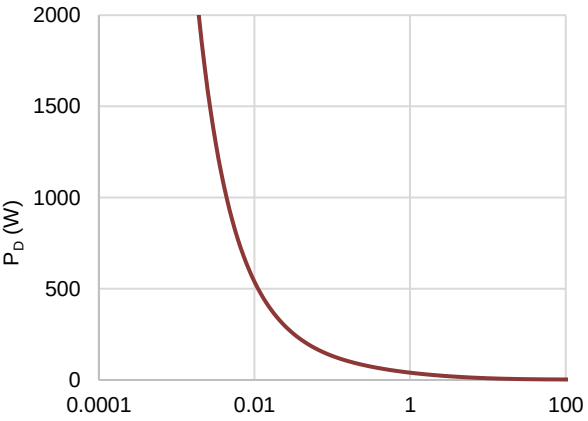


Figure 12: Single Pulse Power Rating Junction-to-Case

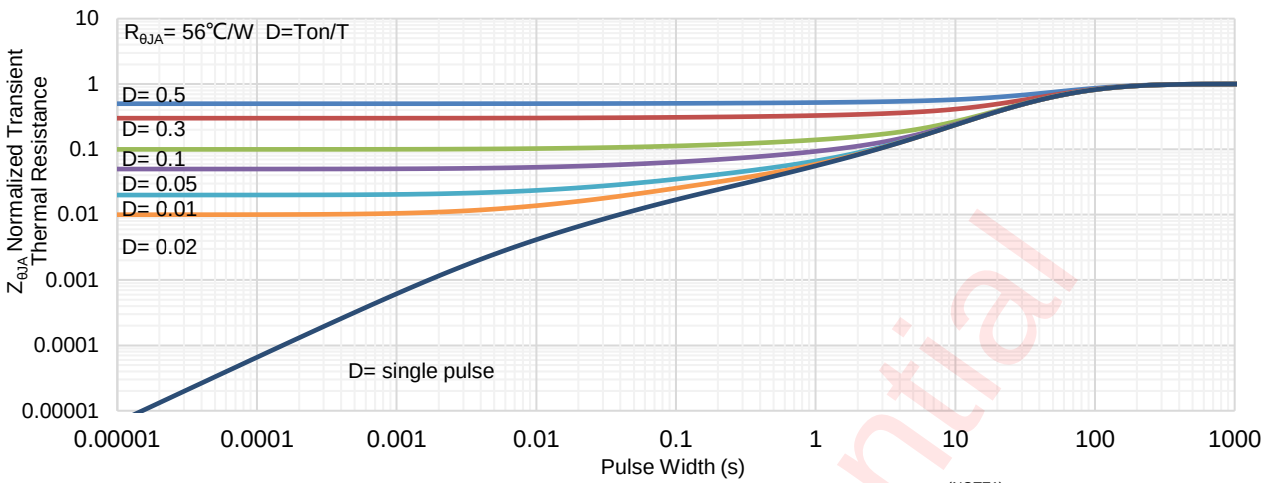
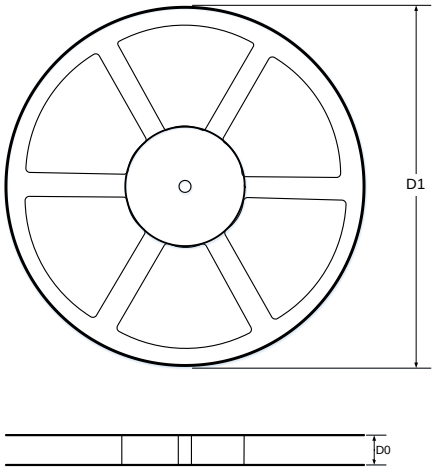


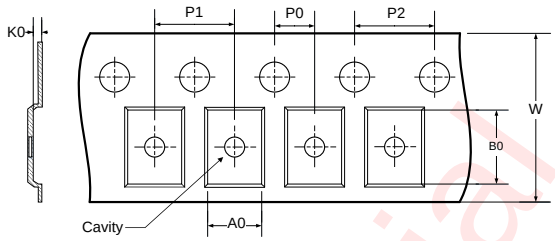
Figure 13: Normalized Maximum Transient Thermal Impedance (NOTE1)

TAPE AND REEL INFORMATION

REEL DIMENSIONS

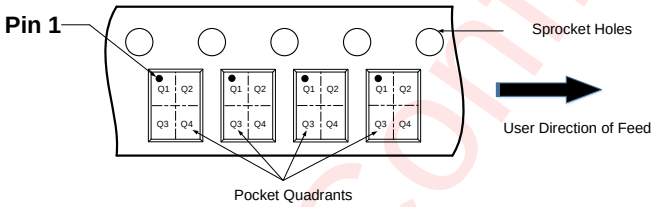


TAPE DIMENSIONS



A0：Dimension designed to accommodate the component width
B0：Dimension designed to accommodate the component length
K0：Dimension designed to accommodate the component thickness
W：Overall width of the carrier tape
P0：Pitch between successive cavity centers and sprocket hole
P1：Pitch between successive cavity centers
P2：Pitch between sprocket hole
D1：Reel Diameter
D0：Reel Width

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



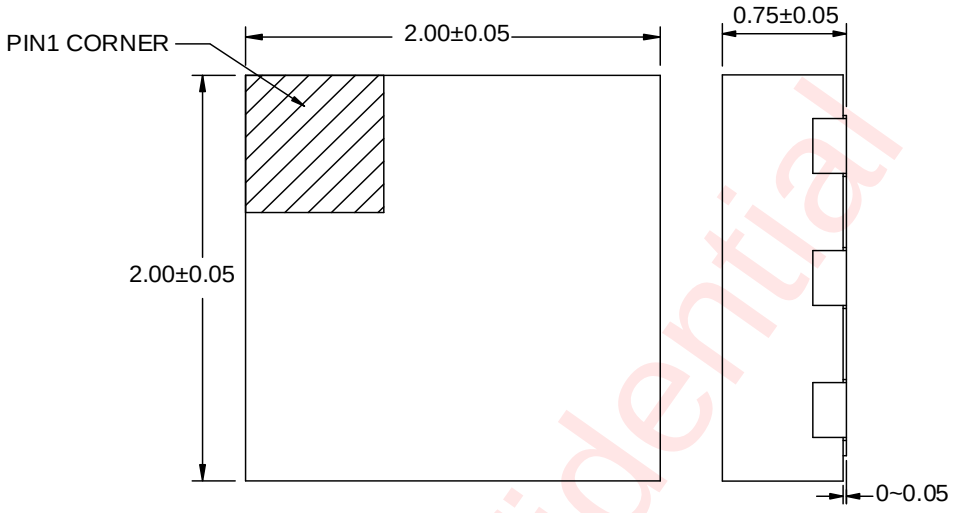
Note：The above picture is for reference only. Please refer to the value in the table below for the actual size

DIMENSIONS AND PIN1 ORIENTATION

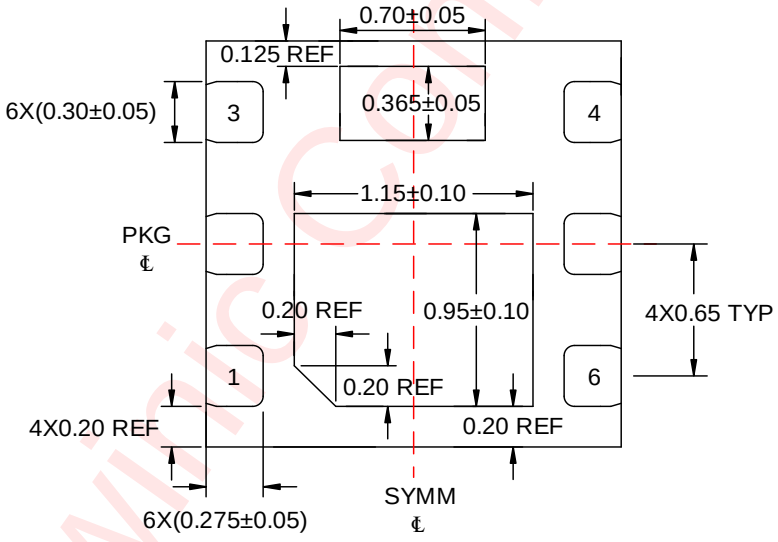
D1 (mm)	D0 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
178	8.4	2.3	2.3	1	2	4	4	8	Q1

All dimensions are nominal

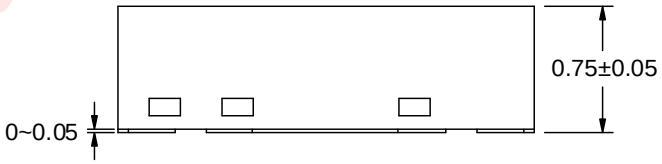
PACKAGE DESCRIPTION



Top View Side View



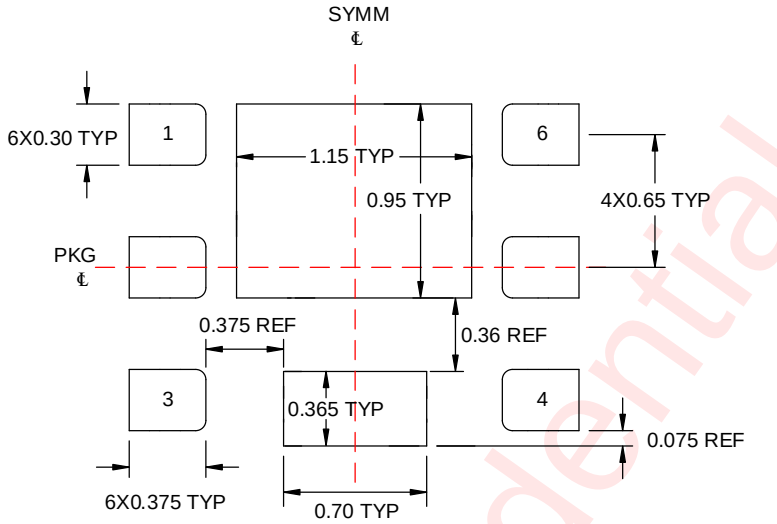
Bottom View

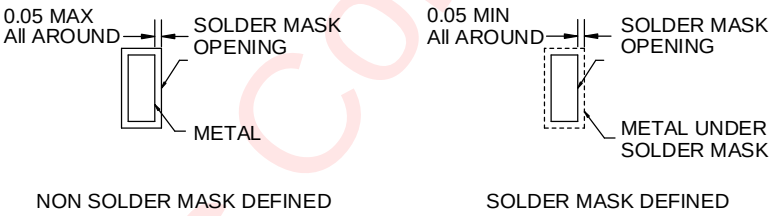


Side View

Unit:mm

LAND PATTERN DATA





NON SOLDER MASK DEFINED

SOLDER MASK DEFINED

Unit：mm

REVISION HISTORY

Version	Date	Change Record
V1.0	Jun. 2021	Initial release
V1.1	Sep. 2021	Updated $R_{DS(ON)}$ VGS=10V spec limit
V1.2	Jul. 2022	Add Figure 6: BV_{DSS} vs T_J, Figure 5: $V_{GS(TH)}$ vs T_J; Update Figure 4: $R_{DS(ON)}$ vs T_J temperature range
V1.3	Jun. 2023	Updated the dimensional tolerances from 0.1mm to 0.05mm in Package Description (Page 8)

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