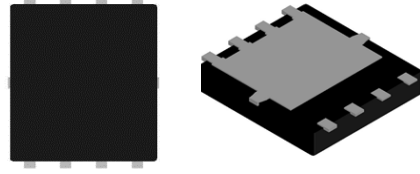


**FEATURES**

- Drain-Source Withstand Voltage: 40V
- Max.  $R_{DS(on)}$  : 8.5m $\Omega$  @  $V_{GS}=10V$   
13.0m $\Omega$  @  $V_{GS}=4.5V$
- Automotive applications
- AEC-Q101 Qualified
- Excellent ON resistance
- General footprint package PDFN5 $\times$ 6-8L
- 100% Rg and Avalanche tested
- MSL1

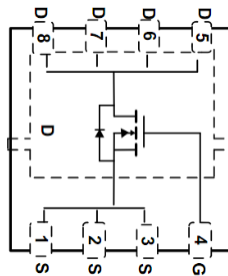
**PRODUCT APPEARANCE**

 PDFN5 $\times$ 6-8L

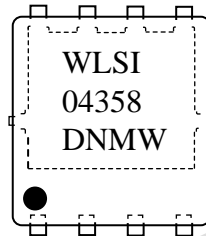
**DESCRIPTION**

The SNM048R5DNAQ is N-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. This device is suitable for use in high performance automotive DC-DC conversion, power switch and charging circuit. Standard Product SNM048R5DNAQ is in compliance with RoHS.

**Applications:**

- Automotive systems
- DC/DC converters
- Power supply converters circuit
- Load/Power Switching for portable device

**PIN CONFIGURATION**


**MARKING**


WLSI = Company (Group) Code  
 04358 = Device Code  
 DN = Special Code  
 M = Month  
 W = Week

**LIMITING VALUES**

Parameter	Symbol	Condition	Value	Unit
Drain-Source Voltage	$V_{DS}$		40	V
Gate-Source Voltage	$V_{GS}$		$\pm 20$	V
Continuous Drain Current	$I_D$	$T_C=25^\circ\text{C}$	48	A
		$T_C=100^\circ\text{C}$	34	A
Pulsed Drain Current <sup>(3)</sup>	$I_{DM}$		109	A
Continuous Drain Current	$I_D$	$T_A=25^\circ\text{C}$	14	A
		$T_A=100^\circ\text{C}$	10	A
Avalanche Energy $L=0.3\text{mH}$	$E_{AS}$		43.3	mJ
Power Dissipation <sup>(2)</sup>	$P_D$	$T_C=25^\circ\text{C}$	36	W
		$T_C=100^\circ\text{C}$	18	W
Power Dissipation <sup>(1)</sup>	$P_D$	$T_A=25^\circ\text{C}$	2.9	W
		$T_A=100^\circ\text{C}$	1.5	W
Operating Junction Temperature	$T_J$		-55 to 175	$^\circ\text{C}$
Storage Temperature Range	$T_{STG}$		-55 to 175	$^\circ\text{C}$

**THERMAL RESISTANCE RATINGS**

Single Operation					
Parameter		Symbol	Typical	Maximum	Unit
Junction-to-Ambient Thermal Resistance <sup>(1)</sup>	Steady State	R <sub>θJA</sub>	43.0	51.6	°C/W
Junction-to-Case Thermal Resistance <sup>(2)</sup>	Steady State	R <sub>θJC</sub>	3.0	4.2	

**ELECTRONICS CHARACTERISTICS**

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-to-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0 V, I <sub>D</sub> = 250μA	40			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	BV <sub>DSS</sub> /T <sub>J</sub>			18.2		mV/°C
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =40V, V <sub>GS</sub> = 0V, T <sub>J</sub> =25°C			1	μA
		V <sub>DS</sub> =40V, V <sub>GS</sub> = 0V, T <sub>J</sub> =125°C			100	μA
Gate-to-source Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> =0 V, V <sub>GS</sub> = ±20V			±100	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> = 250μA	1.3	1.7	2.1	V
Threshold Temperature Coefficient	V <sub>GS(TH)</sub> /T <sub>J</sub>			-4.7		mV/°C
Drain-to-source On-resistance <sup>(4)</sup>	R <sub>DSON</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =10A		7.1	8.5	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A		9.9	13.0	mΩ
<b>CHARGES, CAPACITANCES AND GATE RESISTANCE</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> = 0V, f = 1.0MHz, V <sub>DS</sub> =20 V		660		pF
Output Capacitance	C <sub>OSS</sub>			197		
Reverse Transfer Capacitance	C <sub>RSS</sub>			11.6		
Total Gate Charge <sup>(5)</sup>	Q <sub>G(TOT)</sub>	V <sub>GS</sub> =10V, V <sub>DS</sub> = 20V, I <sub>D</sub> =10 A		9.5		nC
Gate-to-Source Charge <sup>(5)</sup>	Q <sub>GS</sub>			1.8		
Gate-to-Drain Charge <sup>(5)</sup>	Q <sub>GD</sub>			1.2		

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Gate Resistance	$R_g$	$f=1\text{MHz}$		2.8		$\Omega$
<b>SWITCHING CHARACTERISTICS <sup>(5)</sup></b>						
Turn-On Delay Time	$t_d(\text{ON})$	$V_{GS}=10\text{V},$ $V_{DS}=32\text{V},$ $I_D=10\text{A}, R_G=5\Omega$		2.6		ns
Rise Time	$t_r$			23.6		
Turn-Off Delay Time	$t_d(\text{OFF})$			11		
Fall Time	$t_f$			17		
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F=10\text{A},$ $dI/dt=100\text{A}/\mu\text{s}$		16.1		ns
Body Diode Reverse Recovery Charge	$Q_{rr}$	$I_F=10\text{A},$ $dI/dt=100\text{A}/\mu\text{s}$		3.1		nC
<b>BODY DIODE CHARACTERISTICS</b>						
Forward Voltage <sup>(4)</sup>	$V_{SD}$	$V_{GS}=0\text{V}, I_S=10\text{A}$	0.5	0.8	1.2	V

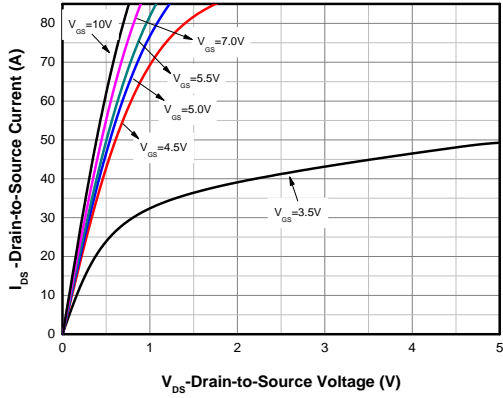
( $T_J=25^\circ\text{C}$ , unless otherwise noted.)

**Note:**

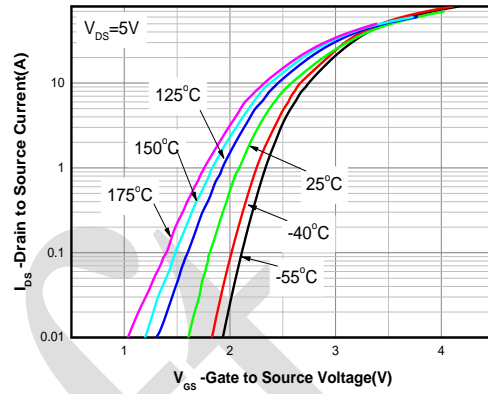
- (1) FR-4 board (38mm X 38mm X t1.6mm, 70 $\mu\text{m}$  Copper) partially covered with copper (645mm<sup>2</sup> area). The power dissipation  $P_{DSM}$  is based on Junction-to-Ambient thermal resistance value and the  $T_{J(\text{MAX})}=175^\circ\text{C}$ . The value is only for reference, any application depends on the user's specific board design.
- (2) The power dissipation  $P_D$  is based on  $T_{J(\text{MAX})}=175^\circ\text{C}$ , using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heat sinking is used.
- (3) Repetitive rating, pulsed, duty cycle ~1%, keep initial  $T_J=25^\circ\text{C}$ , the maximum allowed junction temperature of 175 $^\circ\text{C}$ .
- (4) The static characteristics are obtained using ~380us pulses, duty cycle ~1%.
- (5) The parameter is not subject to production test – verified by design / characterization.

**TYPICAL CHARACTERISTICS**

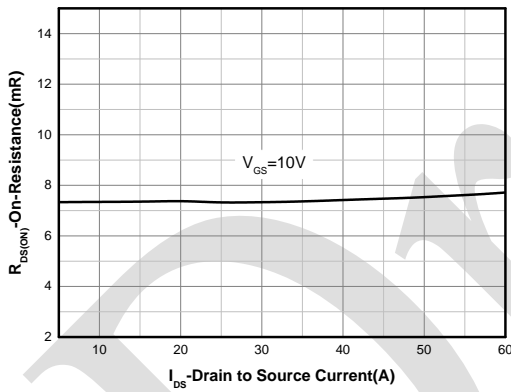
Ta=25°C, unless otherwise noted.



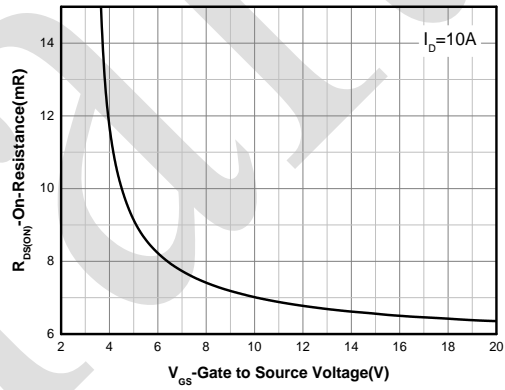
Output Characteristics <sup>(4)</sup>



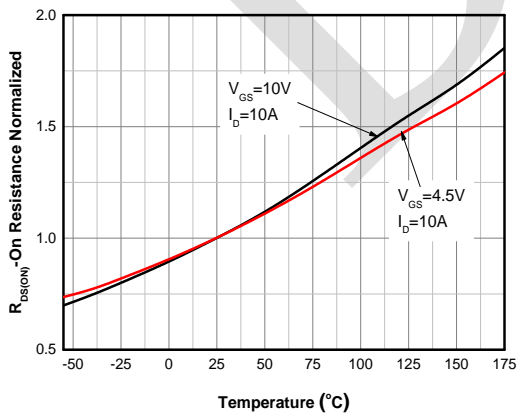
Transfer Characteristics <sup>(4)</sup>



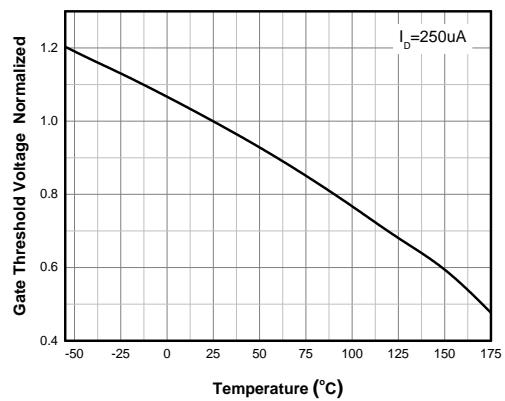
On-Resistance vs. Drain Current <sup>(4)</sup>



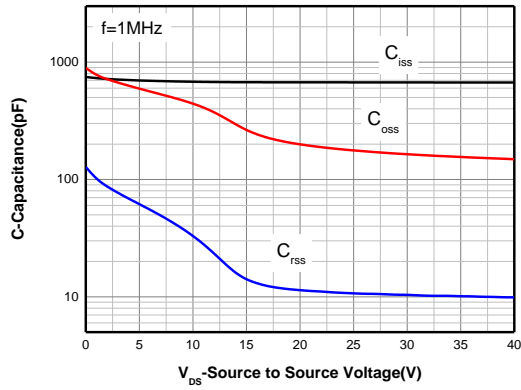
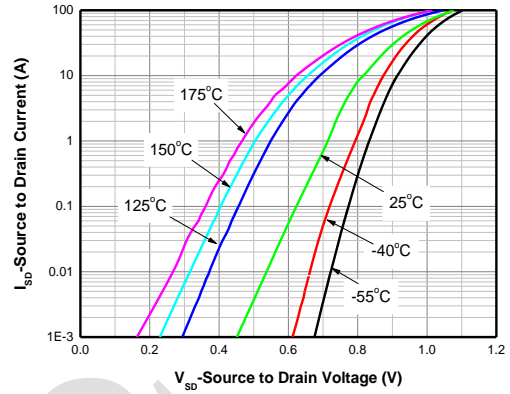
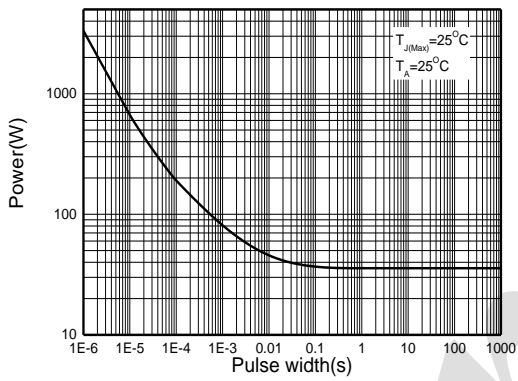
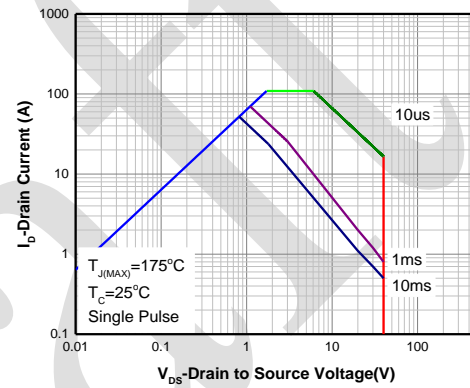
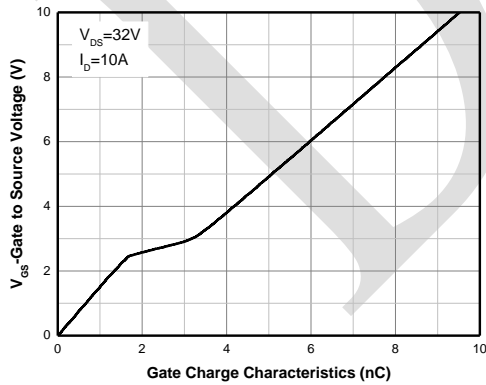
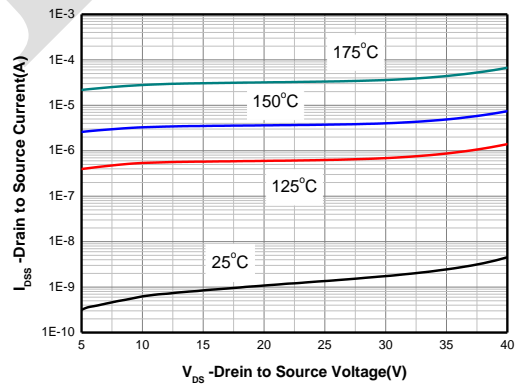
On-Resistance vs. Gate-to-Source Voltage <sup>(4)</sup>

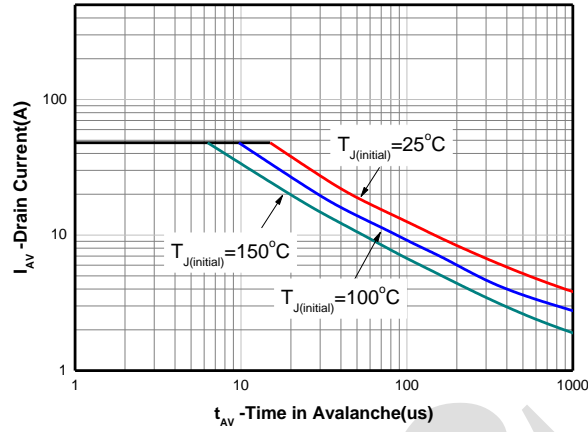
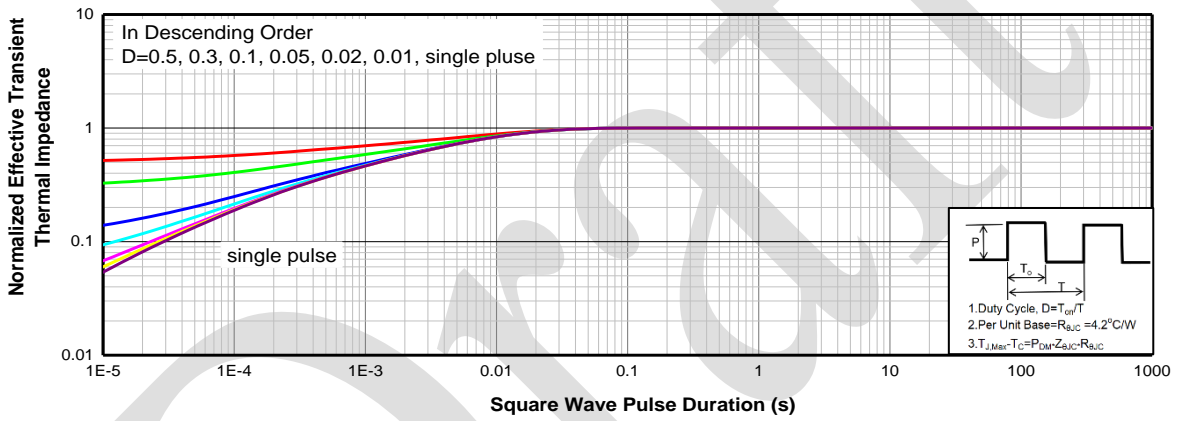
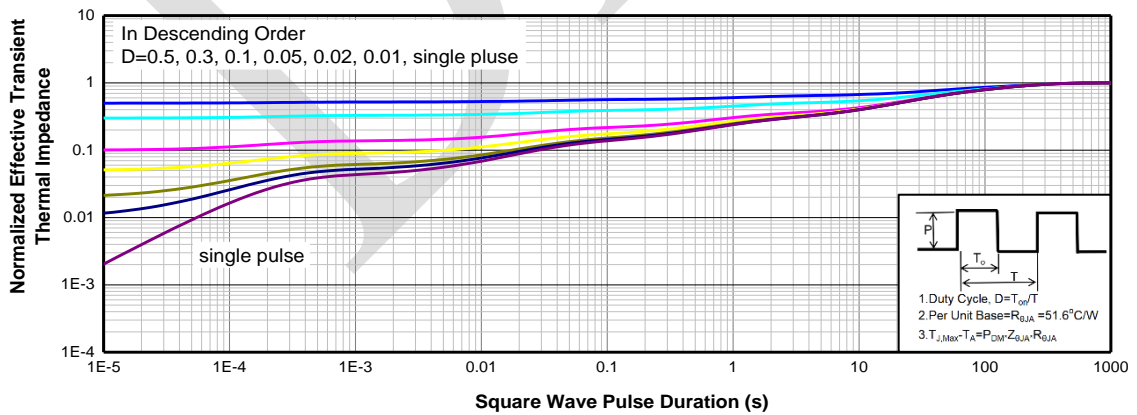


On-Resistance vs. Junction Temperature <sup>(4)</sup>



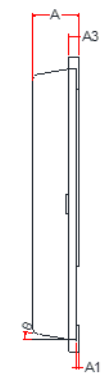
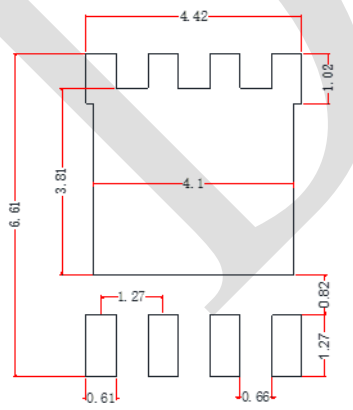
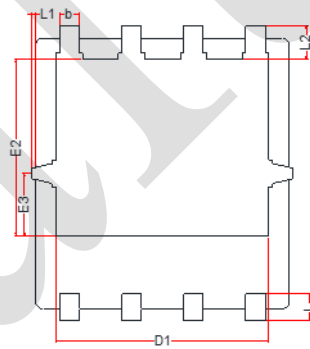
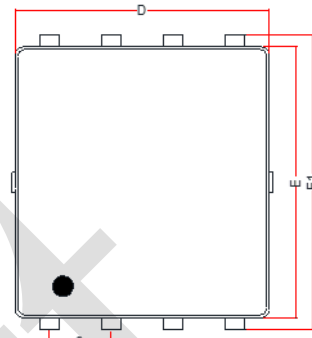
Threshold Voltage vs. Temperature


**Capacitance**

**Body Diode Forward Voltage (4)**

**Single Pulse power**

**Safe Operating Area**

**Gate Charge Characteristics**

**Drain Current vs. Drain Voltage**

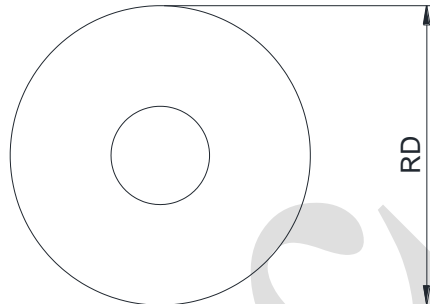
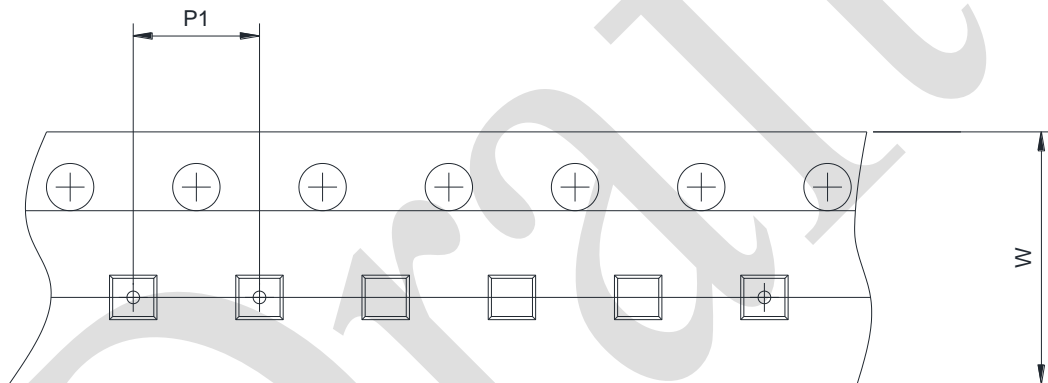
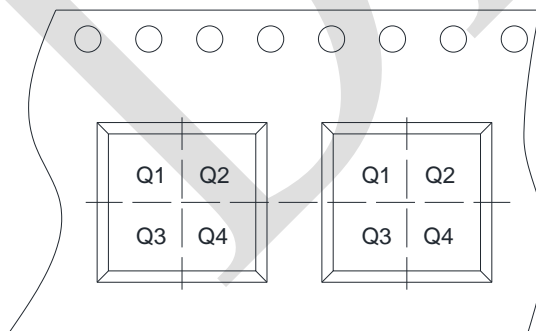

**Avalanche characteristics**

**Transient Thermal Response (Junction-to-Case)**

**Transient Thermal Response (Junction-to-Ambient)**

**PDFN5×6-8L DIMENSIONS**
**PACKAGE SIZE**

Symbol	Min.	Typ.	Max.
A	0.85	0.95	1.00
A1	0.00	-	0.05
A3	-	0.2 Ref	-
b	0.30	0.40	0.50
D	5.10	5.20	5.30
E	5.45	5.55	5.65
e	1.27 BSC		
D1	4.25	4.35	4.45
E1	5.95	6.05	6.15
E2	3.525	3.625	3.725
E3	1.175	1.275	1.375
L	0.45	0.55	0.65
L1	0	-	0.15
L2	0.68 Ref		
θ	0 °	-	10 °





**TAPE AND REEL INFORMATION**
**Reel Dimensions**

**Tape Dimensions**

**Quadrant Assignments For PIN1 Orientation In Tape**


User Direction of Feed

RD	Reel Dimension	<input type="checkbox"/> 7inch	<input checked="" type="checkbox"/> 13inch		
W	Overall width of the carrier tape	<input type="checkbox"/> 8mm	<input checked="" type="checkbox"/> 12mm		
P1	Pitch between successive cavity centers	<input type="checkbox"/> 2mm	<input type="checkbox"/> 4mm	<input checked="" type="checkbox"/> 8mm	
Pin1	Pin1 Quadrant	<input checked="" type="checkbox"/> Q1	<input type="checkbox"/> Q2	<input type="checkbox"/> Q3	<input type="checkbox"/> Q4

**ORDERING INFORMATION**

TYPE NUMBER	PACKAGE	PACKING
SNM048R5DNAQ-8/TR	PDFN5×6-8L	Tape and reel

PDFN5×6-8L is packed with 5000 pieces/disc in braided packaging.

**Important statement**

SIT reserves the right to change the above-mentioned information without prior notice.

Draft

**REVISION HISTORY**

Version number	Datasheet status	Revision date
V0.2	Draft version.	May 2024

Draft