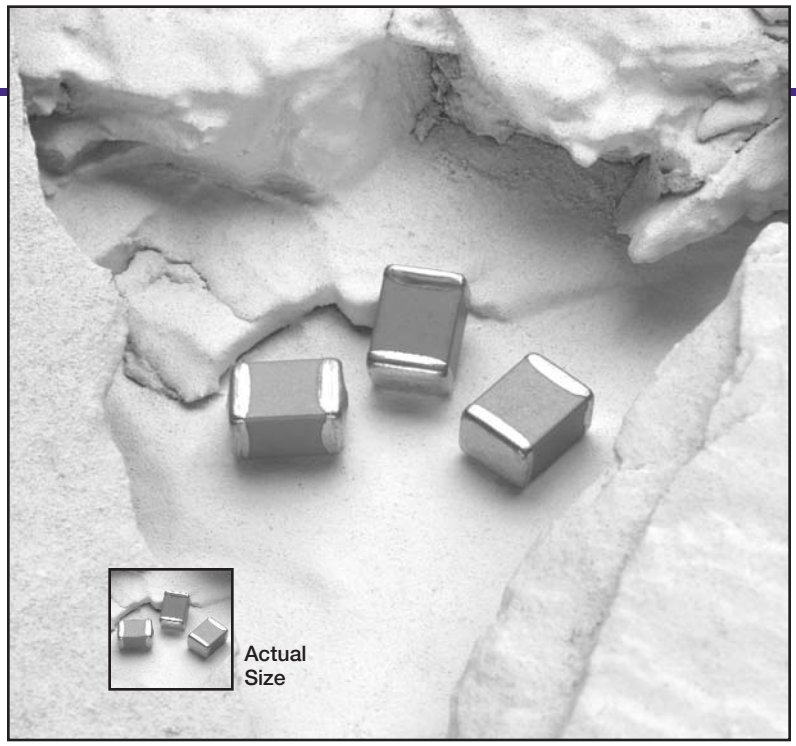
NTS Series

UNITED CHEMI-CON

- X5R/X7R Ceramic
- Surface Mount
- Lead-Free Construction
- High CV
- +125°C Maximum Temperature



The NTS series is a new multilayer ceramic chip capacitor series that offers high CV X5R and X7R dielectrics in environmentally friendly lead-free volumetric efficient packaging. The technologically advanced design of the NTS series capacitors now leads the field in CV ration per chip size and provides excellent electrical characteristics for applications such as noise suppressors for various types of equipment, smoothing circuits in DC-DC converters, voltage regulators for computers, switching power supplies, high reliability equipment or other small sized, high power requirements. The NTS chips have large capacitance, high rated ripple current capability, a wide temperature range and long life. Standard packaging is tape and reel.

Summary of Specifications

- **Surface mount lead terminals.**
- **Capacitance range: 0.1 to 22µF.**
- **Voltage range: 25 to 100VDC.**
- **Category temperature range: −55°C to +125°C.**
- **Standard capacitance tolerance: ±10% or ±20%**
- **Nominal case size (L×W×H): 3.2×1.6×1.8mm to 5.7×5.0×2.8mm.**
- **Rated lifetime: 1,000 hours at +125°C.**

NTS Specifications

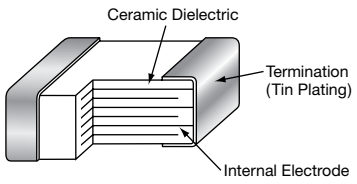
Item	Characteristics
Category Temperature Range	−55 to +125°C
Rated Voltage Range	25 to 100VDC
Capacitance Range	0.1 to 22μF
Capacitance Tolerance	±10% (K); ±20% (M) at +25±2°C, 1±0.1kHz and 1±0.2Vrms for C_R*≤10μF (120±12Hz and 0.5±0.2Vrms for C_R*>10μF).
Dissipation Factor (Tan δ)	5% maximum at +25±2°C, 1±0.1kHz and 1±0.2Vrms for C_R*≤10μF (120±12Hz and 0.5±0.2Vrms for C_R*>10μF).
Rated Ripple Current	At +125°C, the rated ripple current at 10kHz-1MHz is specified in the Ratings Tables. Note: Ripple voltage Vp shall be less than the rated voltage.
Withstand Voltage	No abnormality after applying 250% of the DC rated voltage for 5 seconds at +25±2°C.
Insulation Resistance	100÷C_R* = MΩ or 4,000MΩ, whichever is less, after applying the DC rated voltage for 60±5 seconds at +25±2°C.
Solderability	Using eutectic solder containing Ag 2.5-3wt% at a solder temperature of +235±5°C and a dip time of 2±0.5 seconds, a minimum of 75% of the surface of the terminals shall be covered with new solder.
Soldering Heat Resistance	Using eutectic solder containing Ag 2.5-3wt% at a solder temperature of +260±5°C and a dip time of 2±0.5 seconds, the following specifications shall be satisfied when the capacitors are restored to +25°C. Appearance : no visible damage Capacitance change : ≤ ±15% of initial measured value Tan δ (DF) : ≤ initial specified value Insulation resistance : 100÷C_R* = MΩ or 4,000MΩ, whichever is less (initial specification) Withstand voltage : no abnormality
Temperature Cycle	The following specifications shall be satisfied when the capacitors are restored to +25°C after exposing the capacitors to the four-step temperature cycle shown below for 5 cycles without voltage applied. Step 1: Min. Category Temperature: −55±3°C, 30±3 Step 2: Room Temperature, 3 max. Step 3: Max. Category Temperature: +125±2°C, 30±3 Step 4: Room Temperature, 3 max. Appearance : no visible damage Capacitance change : ≤ ±15% of initial measured value Tan δ (DF) : ≤ initial specified value Insulation resistance : 100÷C_R* = MΩ or 4,000MΩ, whichever is less (initial specification) Withstand voltage : no abnormality
Humidity Load Life	The following specifications shall be satisfied when the capacitors are restored to +25°C after applying the DC rated voltage for 500+24,−0 hours at +40±2°C, 90-95% RH. Appearance : no abnormality Capacitance change : ≤ ±15% of initial measured value Tan δ (DF) : ≤ 10% Insulation resistance : 25÷C_R* = MΩ or 1,000MΩ, whichever is less Withstand voltage : no abnormality
Endurance (Load Life)	The following specifications shall be satisfied when the capacitors are restored to +25°C after applying 200% of the DC rated voltage for 1,000+48,−0 hours at +85±2°C, or 1,000+48,−0 hours at +125±3°C with the initial DC rated voltage applied. Appearance : no abnormality Capacitance change : ≤ ±15% of initial measured value Tan δ (DF) : ≤ 10% Insulation resistance : 50÷C_R* = MΩ or 1,000MΩ, whichever is less Withstand voltage : no abnormality

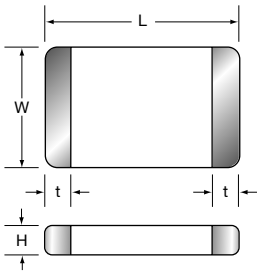
*C_R = Rated Capacitance in μF

Construction and Diagram of Dimensions

Multilayer Ceramic Chips

Unit: mm





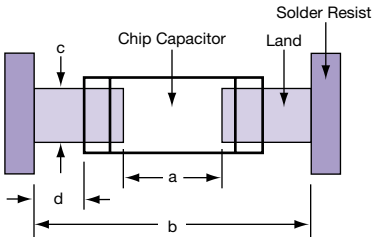
Case Dimensions

Case Code	L	W	H max.	t
30	3.2±0.2	1.6±0.2	1.8	0.5±0.3
40	3.2±0.4	2.5±0.3	2.6	0.6±0.3
50	4.5±0.4	3.2±0.4	2.6 or 2.8	0.6±0.3
60	5.7±0.4	5.0±0.4	2.6 or 2.8	0.8±0.5

Soldering Conditions

Recommended Soldering Land Design

Unit: mm

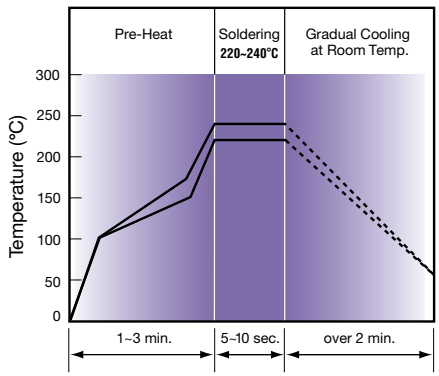


Soldering Land Pattern Dimensions

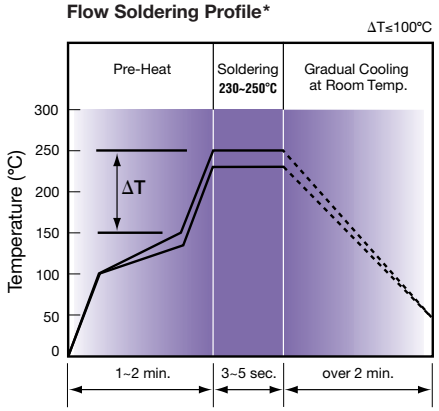
Case Code	a	b	c	d
30	1.8 – 2.5	4.2 – 5.8	1.2 – 1.6	0.4 – 0.8
40	1.8 – 2.5	4.2 – 5.8	1.8 – 2.5	0.5 – 1.0
50	2.5 – 3.5	5.5 – 6.1	2.3 – 3.2	0.6 – 1.1
60	2.7 – 4.7	6.7 – 8.3	3.5 – 5.0	0.7 – 1.2

Recommended Soldering Temperature Profiles

Reflow Soldering Profile



Flow Soldering Profile*

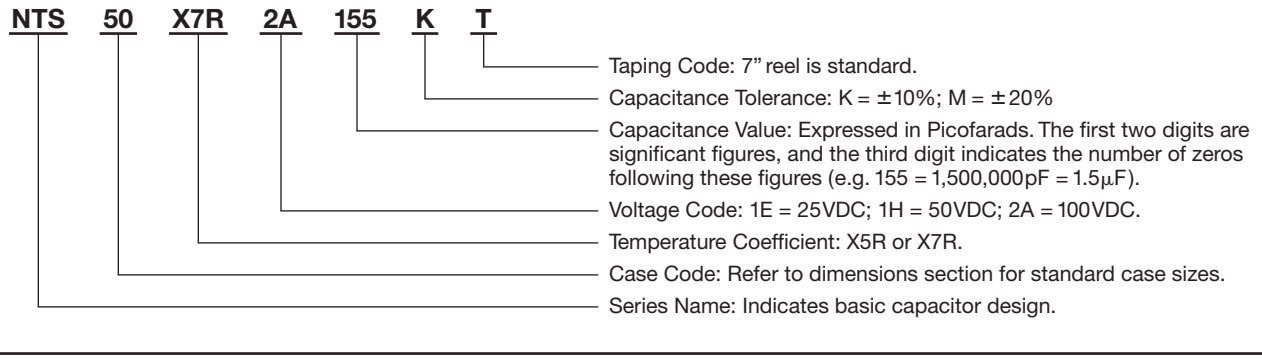


*Flow soldering for case codes 30, 40, 50 only.

NTS Series

Part Numbering System for NTS Series

When ordering, always specify complete catalog number for NTS Series.



Standard Voltage Ratings - Multilayer Ceramic Chips

Rated Voltage (WVDC)	Capacitance (μF)	Catalog Part Number	Nominal Case Size* L×W×H (mm)	Case Code	Rated Ripple Current (A rms) at +125°C, 10kHz-1MHz
25 Volts	1.0	NTS30X5R1E105MT	3.2 × 1.6 × 1.8	30	0.3
	1.5	NTS30X5R1E155MT	3.2 × 1.6 × 1.8	30	0.3
	2.2	NTS40X5R1E225MT	3.2 × 2.5 × 2.6	40	0.5
	3.3	NTS40X5R1E335MT	3.2 × 2.5 × 2.6	40	0.5
	4.7	NTS40X5R1E475MT	3.2 × 2.5 × 2.6	40	0.5
	6.8	NTS50X5R1E685MT	4.5 × 3.2 × 2.6	50	1.0
	10	NTS50X5R1E106MT	4.5 × 3.2 × 2.8	50	1.0
	15	NTS60X5R1E156MT	5.7 × 5.0 × 2.6	60	2.0
	22	NTS60X5R1E226MT	5.7 × 5.0 × 2.8	60	2.0
50 Volts	0.33	NTS30X5R1H334MT	3.2 × 1.6 × 1.8	30	0.3
	0.47	NTS30X5R1H474MT	3.2 × 1.6 × 1.8	30	0.3
	0.68	NTS30X5R1H684MT	3.2 × 1.6 × 1.8	30	0.3
	1.0	NTS40X5R1H105MT	3.2 × 2.5 × 2.6	40	0.5
	1.5	NTS40X5R1H155MT	3.2 × 2.5 × 2.6	40	0.5
	2.2	NTS40X5R1H225MT	3.2 × 2.5 × 2.6	40	0.5
	3.3	NTS50X5R1H335MT	4.5 × 3.2 × 2.6	50	1.0
	4.7	NTS50X5R1H475MT	4.5 × 3.2 × 2.8	50	1.0
	6.8	NTS60X5R1H685MT	5.7 × 5.0 × 2.6	60	2.0
	10	NTS60X5R1H106MT	5.7 × 5.0 × 2.8	60	2.0
100 Volts	0.10	NTS30X7R2A104KT	3.2 × 1.6 × 1.8	30	0.3
	0.15	NTS30X7R2A154KT	3.2 × 1.6 × 1.8	30	0.3
	0.22	NTS30X7R2A224KT	3.2 × 1.6 × 1.8	30	0.3
	0.33	NTS40X7R2A334KT	3.2 × 2.5 × 2.6	40	0.5
	0.47	NTS40X7R2A474KT	3.2 × 2.5 × 2.6	40	0.5
	0.68	NTS40X7R2A684KT	3.2 × 2.5 × 2.6	40	0.5
	1.0	NTS50X7R2A105KT	4.5 × 3.2 × 2.8	50	1.0
	1.5	NTS50X7R2A155KT	4.5 × 3.2 × 2.8	50	1.0
	2.2	NTS60X7R2A225KT	5.7 × 5.0 × 2.8	60	2.0
	3.3	NTS60X7R2A335KT	5.7 × 5.0 × 2.8	60	2.0

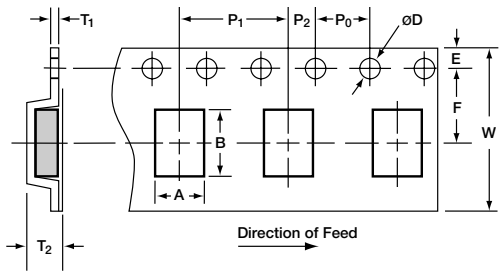
***Refer to diagram for detailed case size dimensions.**

Tape and Reel Specifications

Multilayer Ceramic Chips

Unit: mm

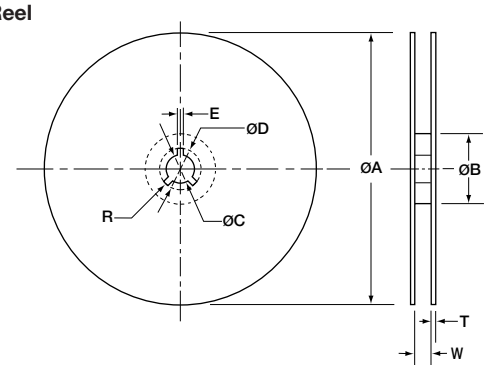
Taping



Taping Dimensions

Dimension	Case Code			
	30	40	50	60
A±0.1	1.9	2.8	3.65	5.5
B±0.1	3.5	3.5	4.95	6.25
W±0.3	8.0	8.0	12.0	12.0
E±0.1	1.75	1.75	1.75	1.75
F±0.05	3.5	3.5	5.5	5.5
P_1±0.1	4.0	4.0	8.0	8.0
P_2±0.05	2.0	2.0	2.0	2.0
P_0±0.1	4.0	4.0	4.0	4.0
øD±0.1	1.5	1.5	1.5	1.5
T_1 max.	0.6	0.6	0.6	0.6
T_2 max.	1.5	2.5	2.8	2.8

Reel



Reel Dimensions and Quantity Per Reel

Dimension	Case Code			
	30	40	50	60
øA±2	178	178	178	178
øB min.	50	50	50	50
øC±0.5	13	13	13	13
øD±0.8	21	21	21	21
E±0.5	2	2	2	2
W±0.5	9	9	13	13
T±0.5	1	1	1	1
R	1.0	1.0	1.0	1.0
Pieces Per Reel*	3,000	1,600	800	800

*Specified quantity may vary for rating of capacitor.