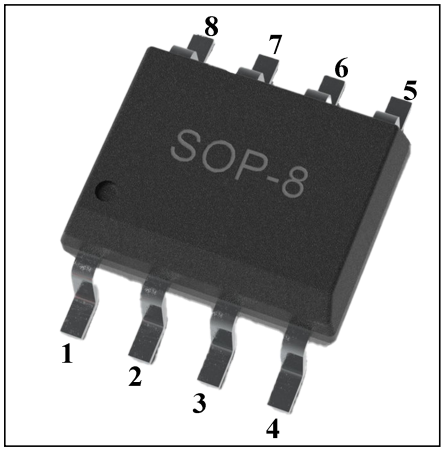
TN13P40PA

Description

P-Channel Enhancement Mode Power MOSFET

The TN13P40PA uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.



General Features

- V_{DS} = −40V,I_D = −13A
  R_{DS}(on)<15mΩ @V_{GS}= −10V
  R_{DS}(on)<18mΩ @V_{GS}= −4.5V
- High density cell design for ultra low $R_{DS(on)}$
- Fully characterized avalanche voltage and current

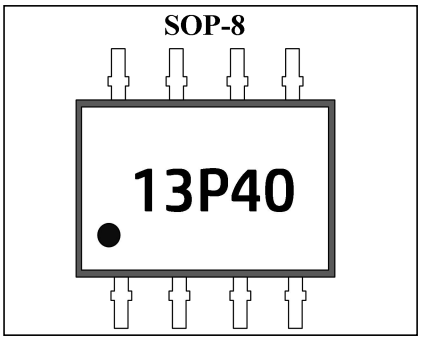
Mechanical Characteristics

- Package:SOP-8
- Packaging: Tape and Reel per EIA 481
- RoHS Compliant
- Marking : Making Code

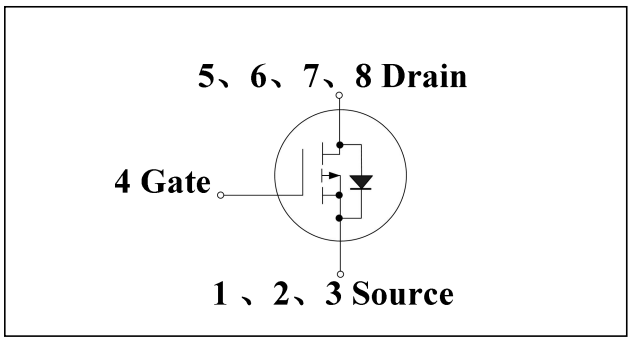
Applications

- Power switching application
- Hard switched and high frequency circuits
- DC-DC converter

Marking : Making Code



Schematic Diagram



Absolute Maximum Rating(Ratings at 25 °C ambient temperature unless otherwise specified.)

Parameter	Symbols	Value	Unit
Drain-Source Voltage	−V_{DS}	40	V
Gate-Source Voltage	−V_{GS}	±20	V
Drain Current-Continuous	−I_D	13	A
Drain Current-Continuous(TC=100°C)	I_D (100°C)	9	A
Drain Current-Pulsed Note1	−I_{DM}	50	A
Junction Temperature	P_D	2.5	W
Maximum Power Dissipation	T_J	150	°C
Storage Temperature Range	T_{STG}	-55 to +150	°C

Thermal Characteristics

Thermal Resistance,Junction-to-Ambient Note2	$R_{\theta JA}$	50	°C/W

Electrical Characteristics(Tc=25°C Unless otherwise specified)

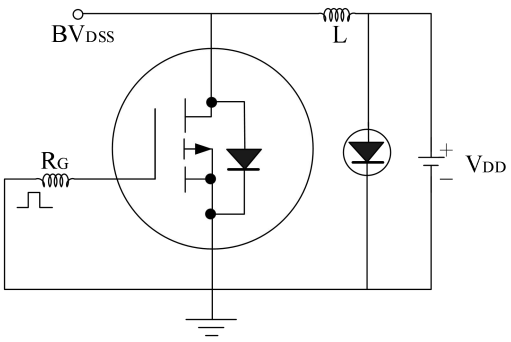
Parameter	Symbols	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	$-V_{(BR)DSS}$	V_{GS}=0V,I_D=−250μA	40	--	--	V
Zero Gate Voltage Drain Current	$-I_{DSS}$	V_{DS}=−40V,V_{GS}=0V	--	--	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	--	--	±100	μA
Gate Threshold Voltage Note3	$-V_{GS(th)}$	V_{DS}=V_{GS},I_D=−250μA	1.3	2.0	2.5	V
Drain-Source On-Resistance Note3	$R_{DS(ON)}$	V_{GS}=−10V,I_D=−12A	--	12	15	mΩ
Forward Transconductance Note4	g_{FS}	V_{DS}=−15V,I_D=−10A	35	--	--	S
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS}=−20V,V_{GS}=0V,f=1MHz	--	2800	--	pF
Output Capacitance	C_{oss}		--	320	--	pF
Reverse Transfer Capacitance	C_{rss}		--	220	--	pF
Total Gate Charge	Q_g	V_{DS}=−20V,I_D=−12A, V_{GS}=−10V	--	40	--	nC
Gate-Source Charge	Q_{gs}		--	6	--	nC
Gate-Drain Charge	Q_{gd}		--	12	--	nC
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=−20V, R_L=2Ω, V_{GS}=−10V,R_{GEN}=6Ω	--	11	--	nS
Turn-on Rise Time	t_r		--	79	--	nS
Turn-off Delay Time	$t_{d(off)}$		--	89	--	nS
Turn-off Fall Time	t_f		--	35	--	nS
Source-Drain Diode Characteristics						
Diode Forward Voltage Note3	$-V_{SD}$	V_{GS}=0V,I_S=12A	--	--	−1.2	V
Diode Forward Current Note2	$-I_S$	--	--	--	13	A

Notes:

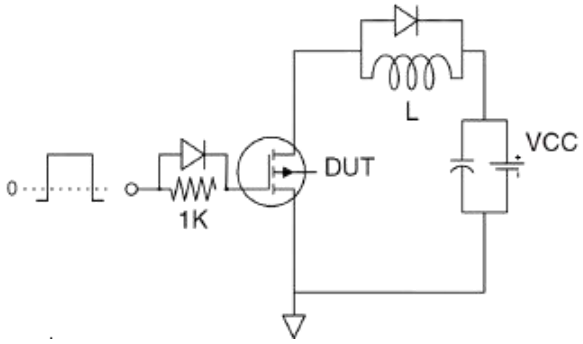
- Repetitive Rating: Pulse width limited by maximum junction temperature.
- Surface Mounted on FR4 Board, t ≤ 10 sec.
- Pulse Test: Pulse width≤300 μ s, duty cycle≤2%.

Test Circuit

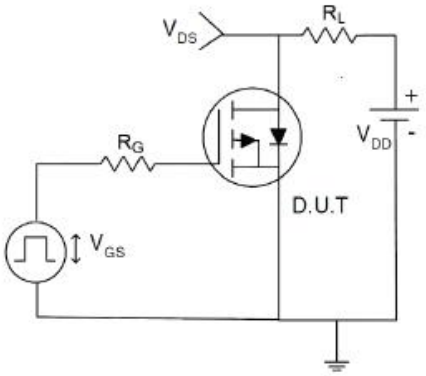
- EAS Test Circuit



- Gate Charge Test Circuit



- Switch Time Test Circuit



Typical Characteristics Curves

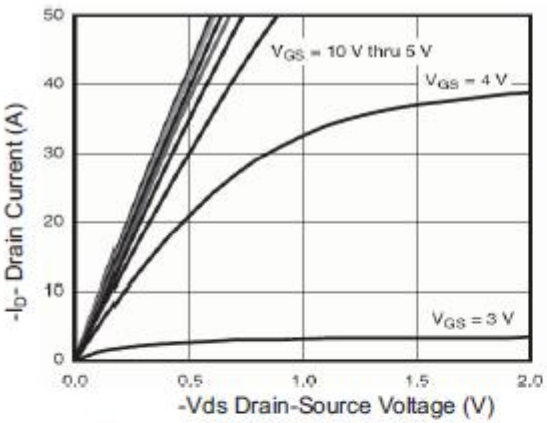


Figure 1 Output Characteristics

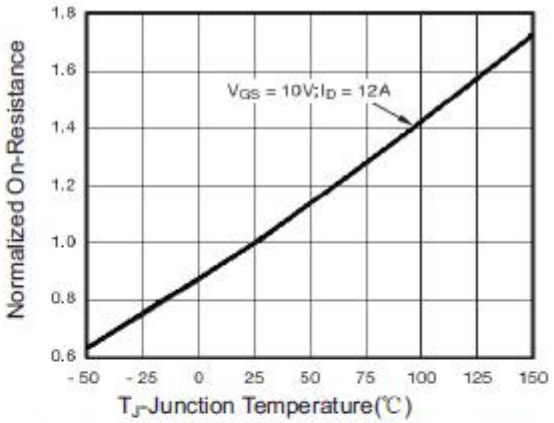


Figure 4 Rdson-Junction Temperature

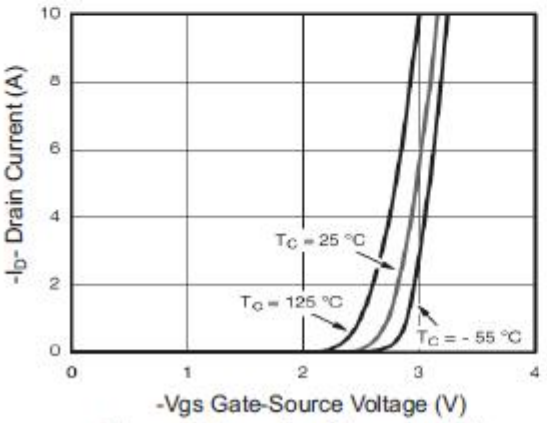


Figure 2 Transfer Characteristics

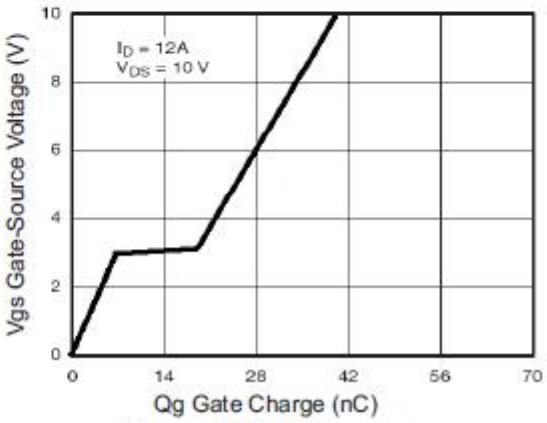


Figure 5 Gate Charge

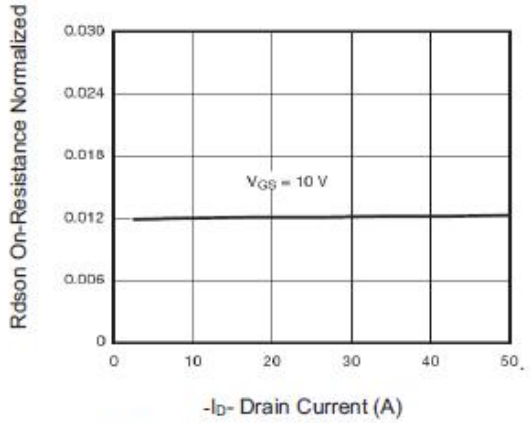


Figure 3 Rdson- Drain Current

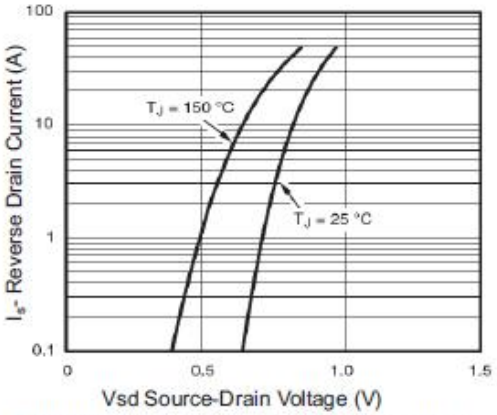


Figure 6 Source- Drain Diode Forward

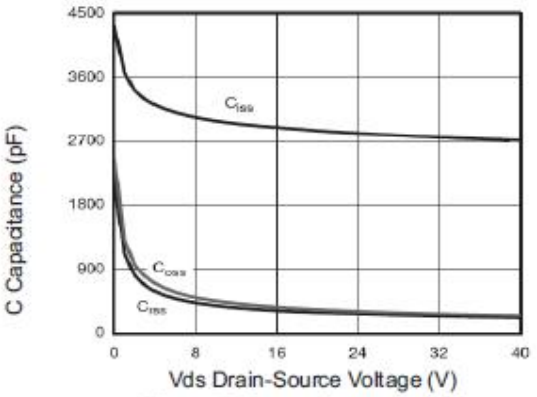


Figure 7 Capacitance vs Vds

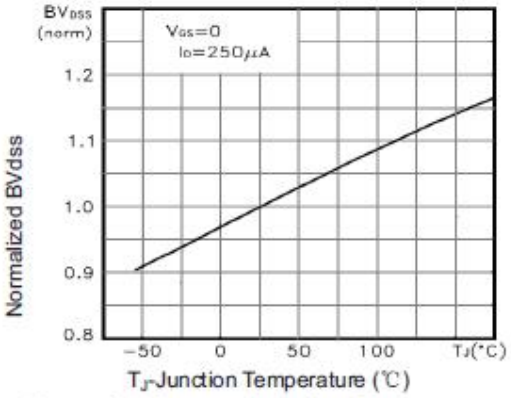


Figure 9 BV_{DSS} vs Junction Temperature

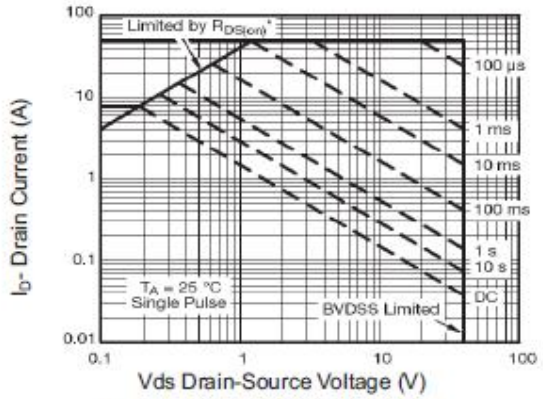


Figure 8 Safe Operation Area

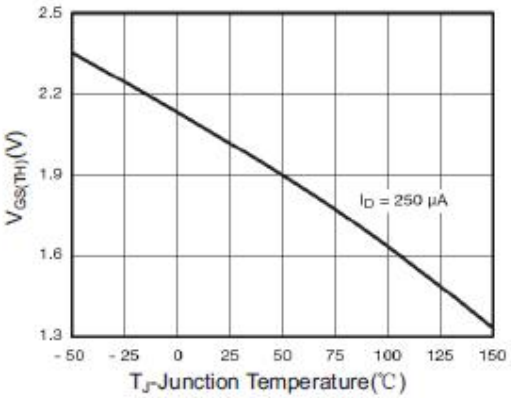


Figure 10 $V_{GS(th)}$ vs Junction Temperature

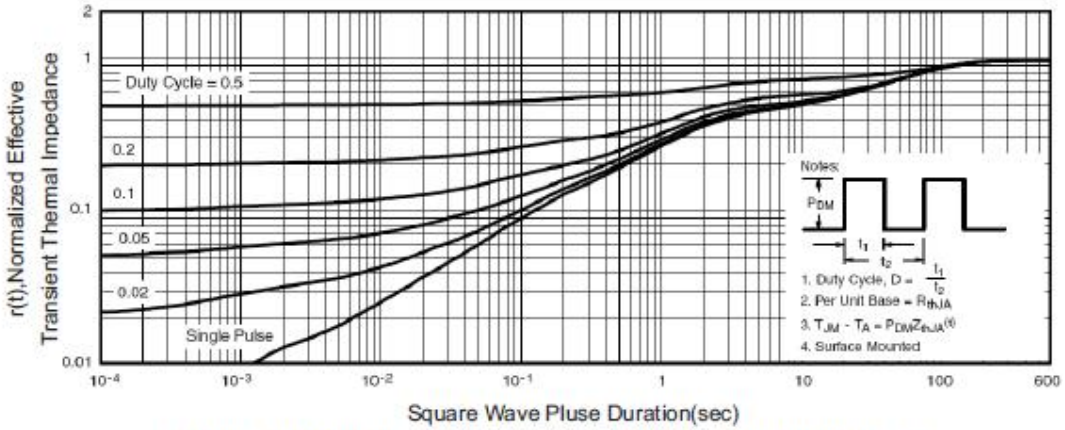
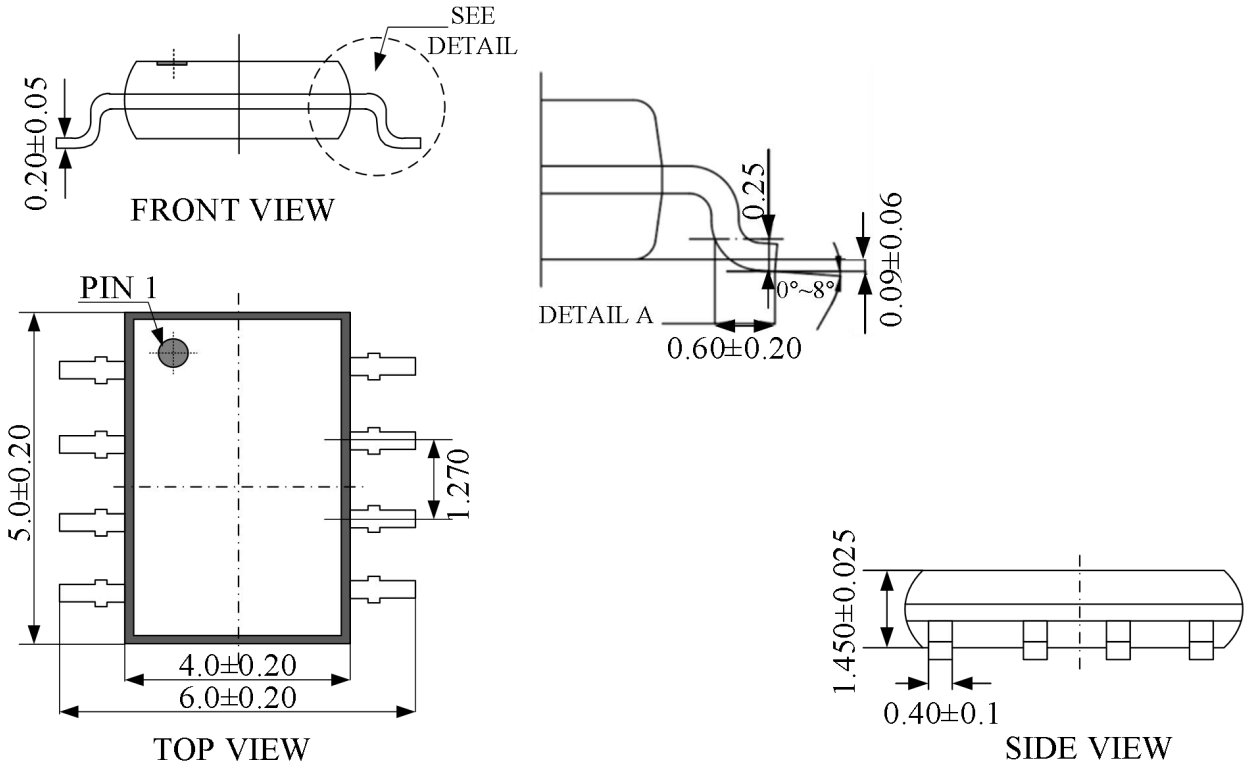


Figure 11 Normalized Maximum Transient Thermal Impedance

Outline Drawing – SOP-8(Dimensions in mm)

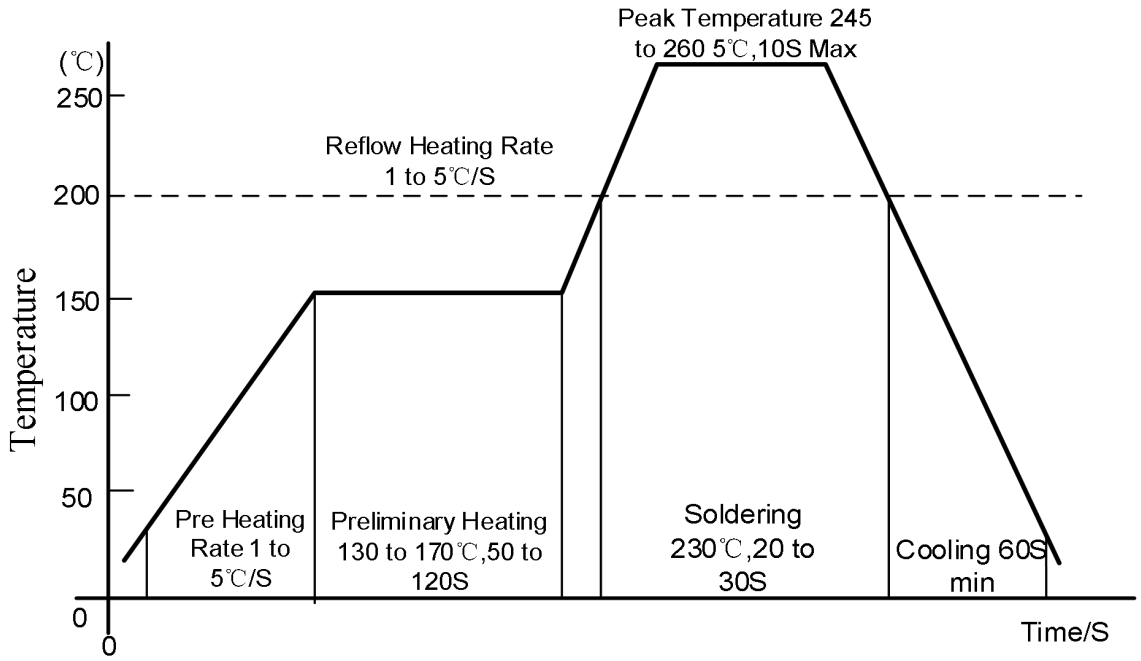


Package Information

Package Type	Description	Quantity（pcs）	Standard
SOP-8	Reel -13″ tape	4000	EIA-481

Conditions of Soldering and Storage

- **Recommended condition of reflow soldering**



Recommended peak temperature is over 245° C. If peak temperature is below 245° C, you may adjust the following parameters:

●Time length of peak temperature (longer)
●Time length of soldering (longer)
●Thickness of solder paste (thicker)

●Conditions of hand soldering

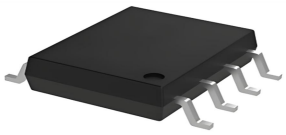
●Temperature: 300°C
●Time: 3s max
●Times: one time

●Storage conditions

●Temperature: 5 to 40° C
●Humidity：30 to 80% RH
●Recommended period：One year after manufacturing

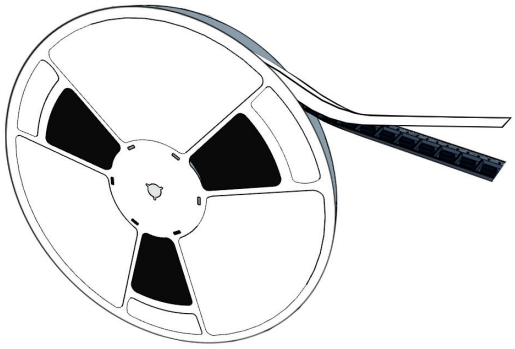
Package Specifications

●The method of packaging



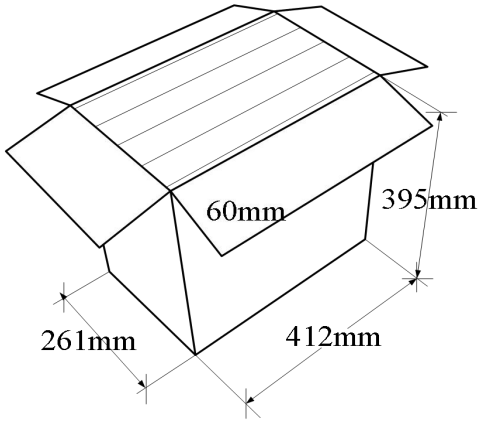
SOP-8

4,000 pcs per reel



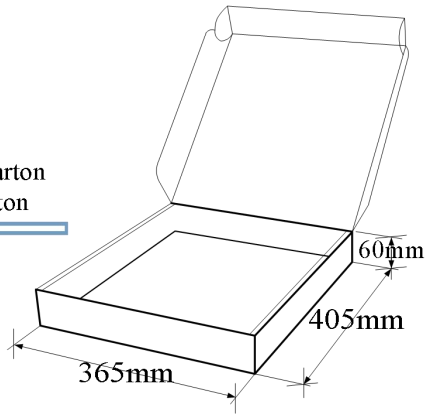
12,000 pcs per box

3 reels per box

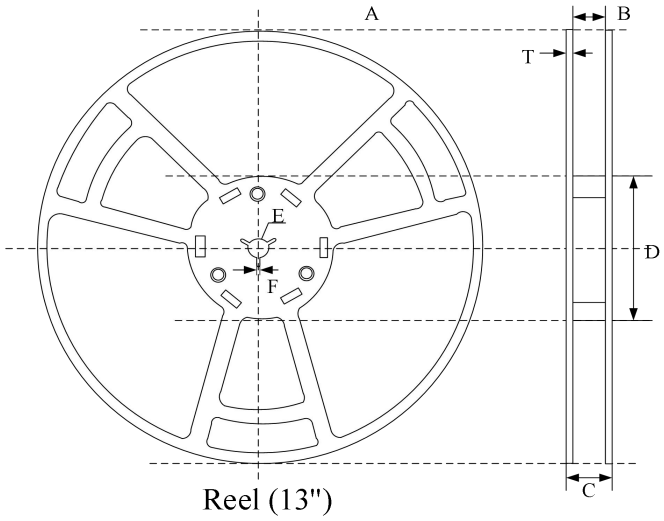


48,000 pcs per carton

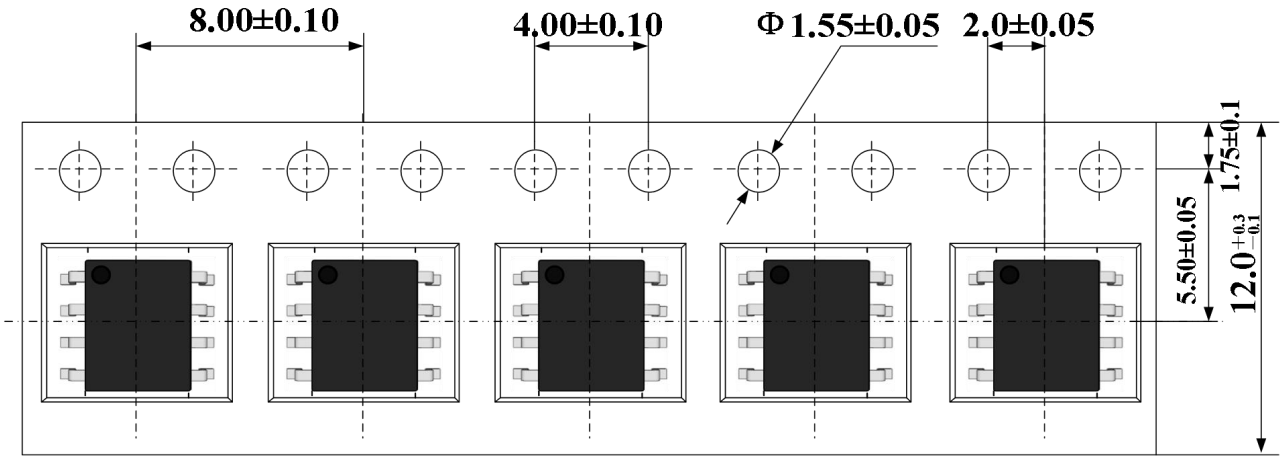
4 boxes per carton



Embossed tape and reel data



Symbol	Value(unit:mm)
A	φ330±1
B	12.7±0.5
C	16.5±0.3
D	φ99.5±0.5
E	φ13.6±0.3
F	2.8±0.3
T	1.9±0.2



Contact Information

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