NCE P-Channel Enhancement Mode Power MOSFET

2301

Description

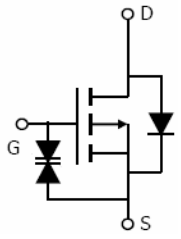
The 2301 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a load switch or in PWM applications .It is ESD protested.

General Features

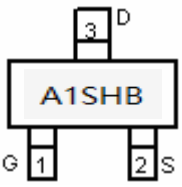
- V_{DS} = -20V,I_D =-2.6A
  $R_{DS(ON)}$ < 150mΩ @ V_{GS}=-2.5V
  $R_{DS(ON)}$ < 120mΩ @ V_{GS}=-4.5V
  ESD Rating: 2000V HBM
- High power and current handing capability
- Lead free product is acquired
- Surface mount package

Application

- Load switch



Schematic diagram



Marking and pin assignment

SOT-23 top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
2301E	NCE2301E	SOT-23	Ø180mm	8 mm	3000 units

Absolute Maximum Ratings (T_A=25℃unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	±10	V
Drain Current-Continuous	I_D	-2.6	A
Drain Current-Pulsed (Note 1)	I_{DM}	-13	A
Maximum Power Dissipation	P_D	1.0	W
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Ambient (Note 2)	$R_{\theta JA}$	125	℃/W

Electrical Characteristics (T_A=25℃unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=-250μA	-20		-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-20V,V_{GS}=0V	-	-	-1	μA

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±10V,V_{DS}=0V	-	-	±10	μA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=-250μA	0.40	0.7	1.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=-4.5V, I_D=-2A	-	87	120	mΩ
		V_{GS}=-2.5V, I_D=-1A	-	125	150	mΩ
Forward Transconductance	g_{FS}	V_{DS}=-5V,I_D=-2A	5		-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=-10V,V_{GS}=0V, F=1.0MHz	-	325	-	PF
Output Capacitance	C_{oss}		-	63	-	PF
Reverse Transfer Capacitance	C_{rss}		-	37	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=-10V,R_L=1. 5Ω V_{GS}=-10V,R_{GEN}=3Ω	-	11		nS
Turn-on Rise Time	t_r		-	5.5		nS
Turn-Off Delay Time	$t_{d(off)}$		-	22		nS
Turn-Off Fall Time	t_f		-	8		nS
Total Gate Charge	Q_g	V_{DS}=-10V,I_D=-2A, V_{GS}=-4.5V	-	3.2		nC
Gate-Source Charge	Q_{gs}		-	0.6	-	nC
Gate-Drain Charge	Q_{gd}		-	0.9	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=-2.6A	-	-	-1.2	V
Diode Forward Current (Note 2)	I_S		-	-	-2.6	A

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production

Typical Electrical and Thermal Characteristics

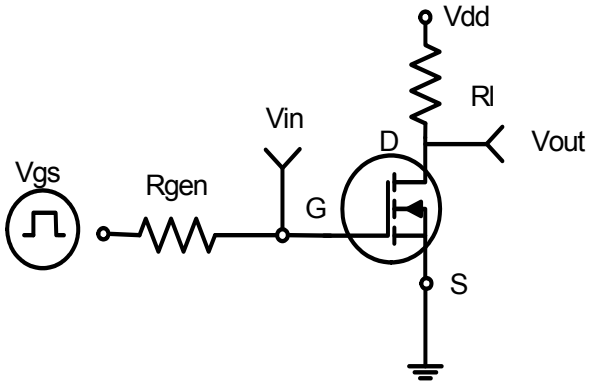


Figure 1:Switching Test Circuit

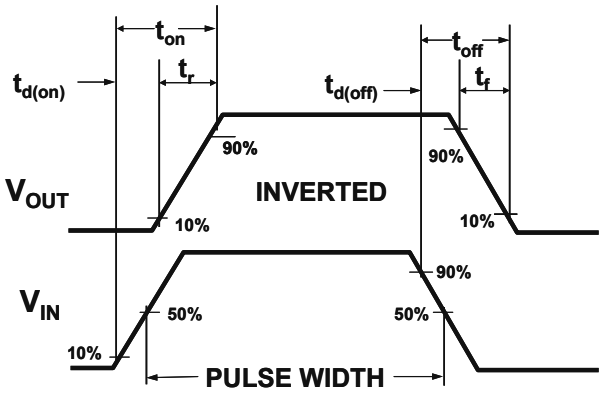


Figure 2:Switching Waveforms

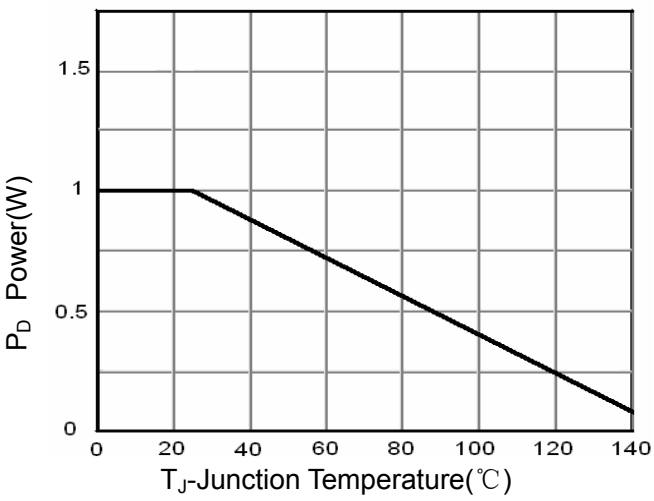


Figure 3 Power Dissipation

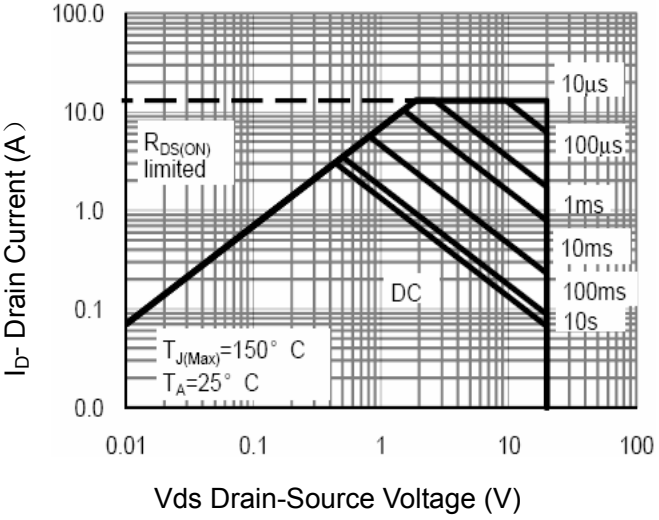


Figure 4 Safe Operation Area

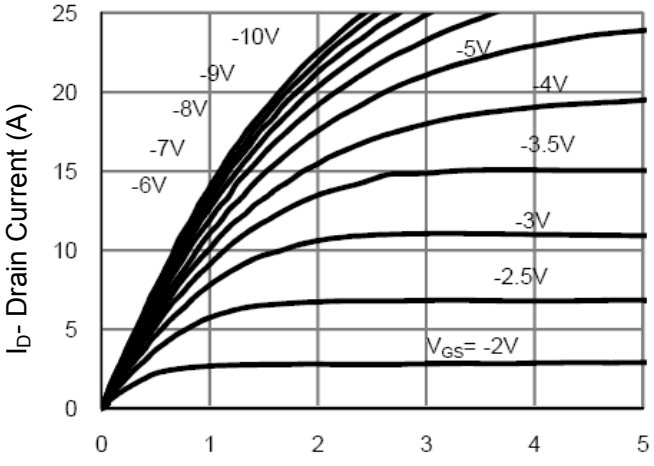


Figure 5 Output Characteristics

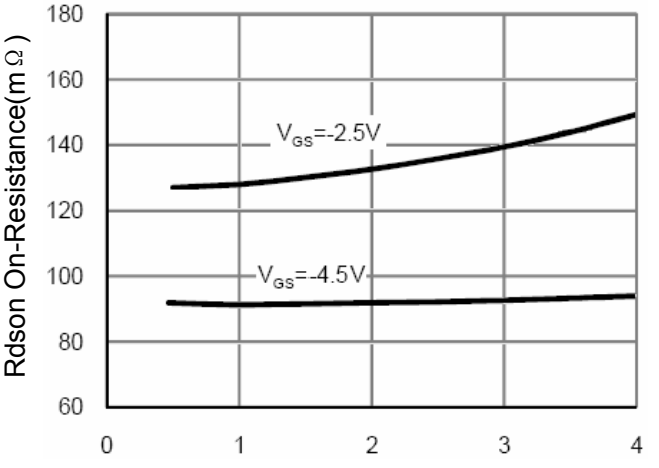


Figure 6 Drain-Source On-Resistance

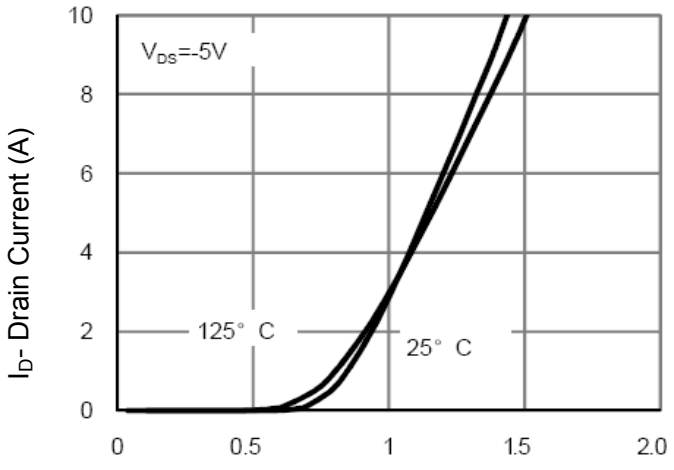


Figure 7 Transfer Characteristics

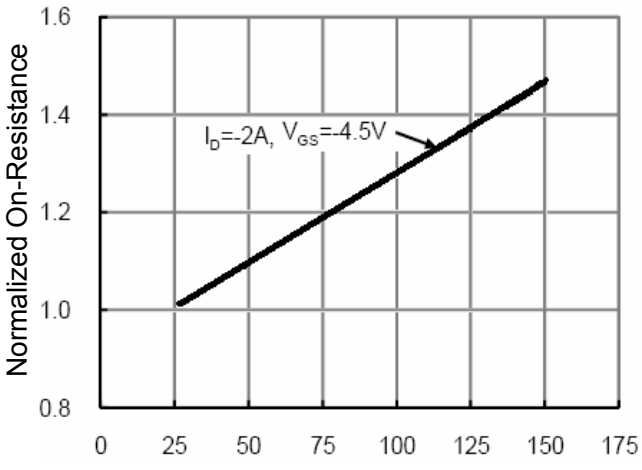


Figure 8 Drain-Source On-Resistance

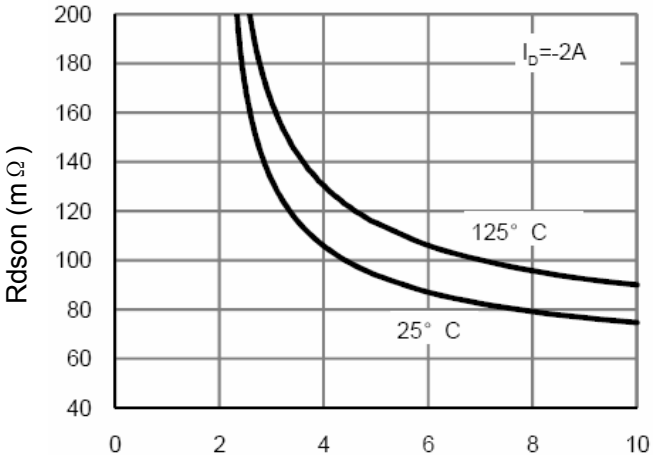


Figure 9 Rdson vs Vgs

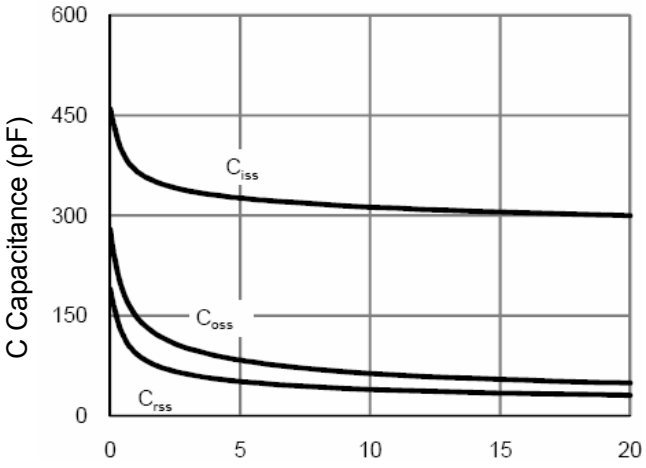


Figure 10 Capacitance vs Vds

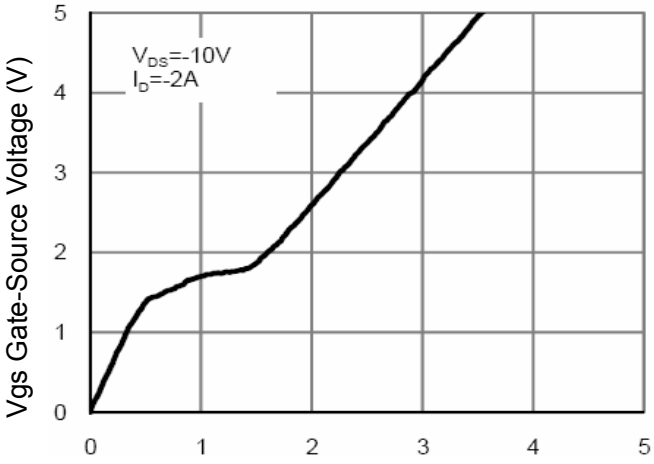


Figure 11 Gate Charge

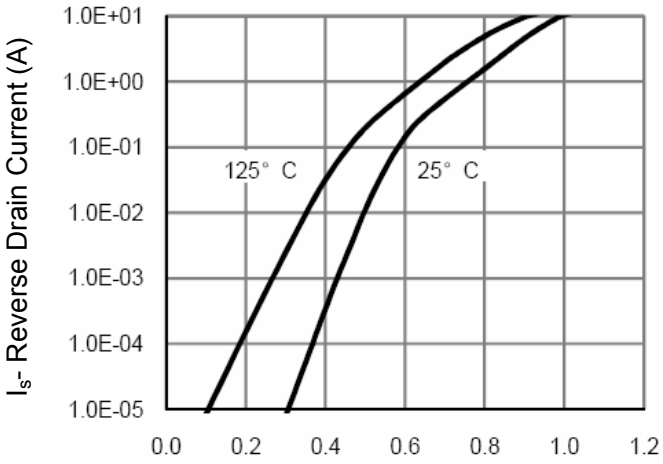


Figure 12 Source- Drain Diode Forward

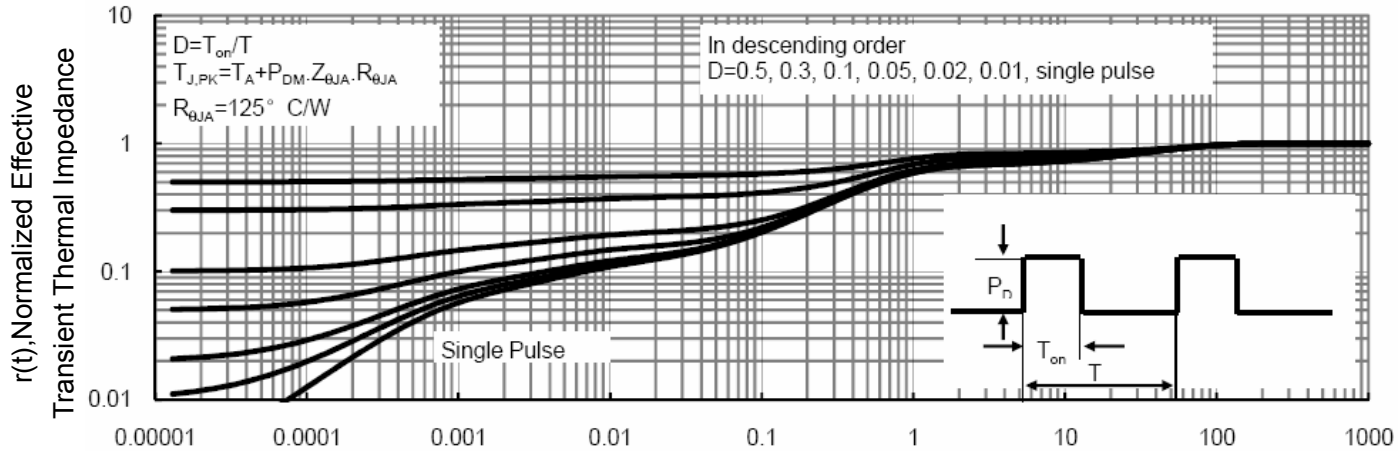
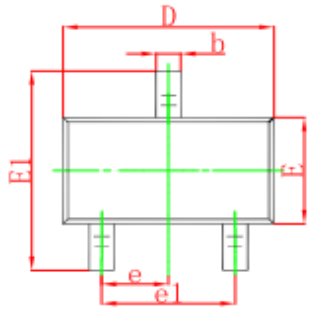
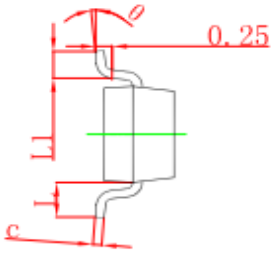
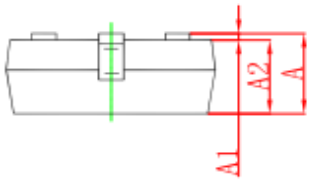


Figure 13 Normalized Maximum Transient Thermal Impedance

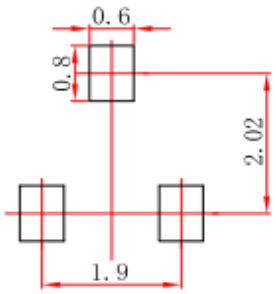
SOT-23 Package Information





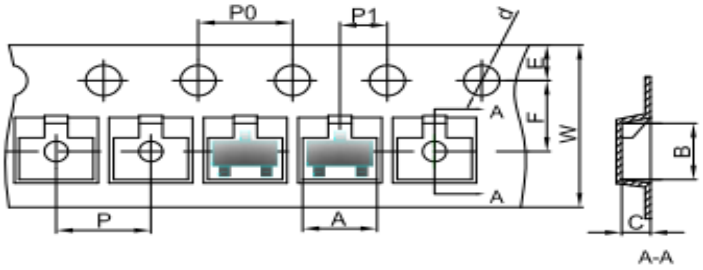


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°



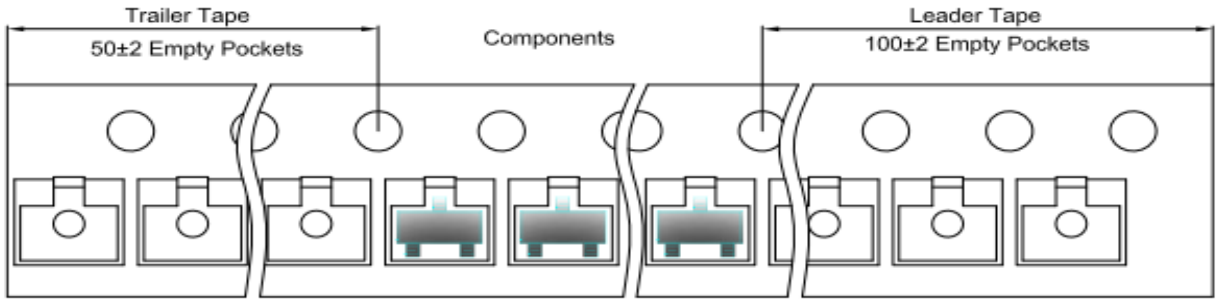
Note:
1.Controlling dimension:in millimeters.
2.General tolerance:± 0.05mm.
3.The pad layout is for reference purposes only.

SOT-23

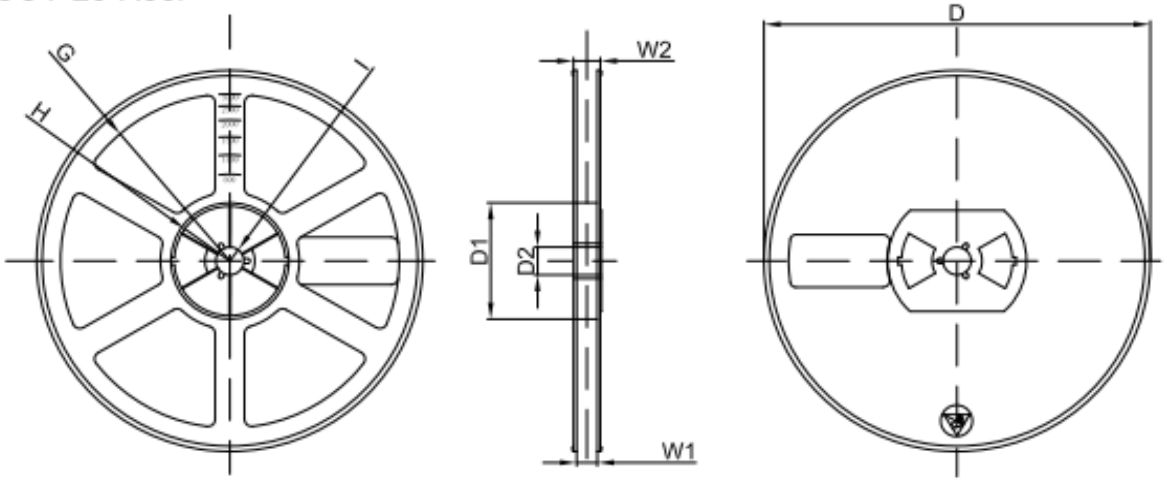


Dimensions are in millimeter										
Pkg type	A	B	C	d	E	F	P0	P	P1	W
SOT-23	3.15	2.77	1.22	Ø1.50	1.75	3.50	4.00	4.00	2.00	8.00

SOT-23 Tape Leader and Trailer



SOT-23 Reel



Dimensions are in millimeter								
Reel Option	D	D1	D2	G	H	I	W1	W2
7"Dia	Ø178.00	54.40	13.00	R78.00	R25.60	R6.50	9.50	12.30

REEL	Reel Size
3000 pcs	7 inch