SOT-223 Plastic-Encapsulate MOSFETS

N-Channel MOSFET

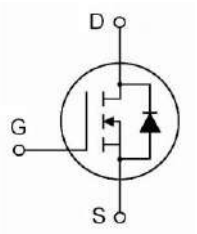
General Description

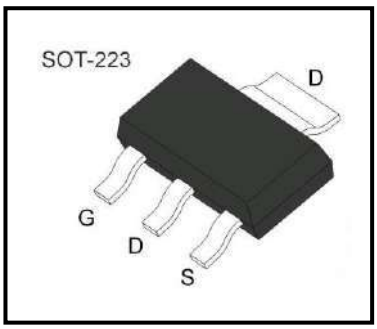
The KL1N60 is a high voltage MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics.

This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits.

Features

- V_{DS} 600V
- I_D 1A
- $R_{DS(ON)}$ (V_{GS} = 10V) 11.5Ω
- Fast switching capability
- Avalanche energy Specified
- Improved dv/dt capability, high ruggedness





Absolute Maximum Ratings (T_C = 25℃, Unless otherwise noted)

Parameter		Symbol	Ratings	Units
Gate-Drain Voltage		V_{DSS}	600	V
Gate-Source Voltage		V_{GSS}	±30	V
Continuous Drain Current		I_D	1	A
Pulsed Drain Current (Note 1)		I_{DM}	4	A
Avalanche Energy	Single Pulsed (Note 2)	E_{AS}	50	mJ
	Repetitive (Note 1)	E_{AR}	4	mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	4.5	V/ns
Power Dissipation		P_D	1	W
Operation Junction Temperature		T_J	150	℃
Storage Temperature Range		T_{STG}	-55～150	℃

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

Thermal Characteristic

Parameter	Symbol	Value	Units
Maximum thermal resistance, junction-case	$R_{\theta JC}$	14	℃/W
Maximum thermal resistance, junction-ambient	$R_{\theta JA}$	150	℃/W

Electrical Characteristics (T_C = 25°C Unless otherwise noted)

Parameter		Symbol	Test Conditions	Min.	Typ	Max.	Units
Statics							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V,I_D=250μA	600			V
Breakdown voltage temperature Coefficient		$\Delta BV_{DSS}/\Delta T_J$	I_D=250μA, Referenced to 25°C		0.5		V/°C
Zero Gate Voltage Drain Current		I_{DSS}	V_{DS}= 600V, V_{GS}= 0V			10	μA
Gate Leakage Current	Forward	I_{GSS}	V_{DS}=0V,V_{GS} = 30V			100	nA
	Reverse		V_{DS}=0V,V_{GS} = -30V			-100	
Gate Threshold Voltage		$V_{GS(th)}$	V_{DS}=V_{GS},I_D= 250μA	2		4	V
Drain-source On-Resistance		$R_{DS(ON)}$	V_{GS} = 10V,I_D = 0.5A			11.5	Ω
Dynamic							
Input Capacitance		Ciss	V_{DS} = 25V,V_{GS} = 0V, f = 1.0MHz		120		pF
Output Capacitance		Coss			20		
Reverse Transfer Capacitance		Crss			3		
Turn-On DelayTime		$t_{d(on)}$	V_{DS} = 300V, I_D=1A V_{GS} = 10V,R_G = 50Ω (Note 4,5)		5		nS
Turn-On Rise Time		t_r			25		
Turn-Off DelayTime		$t_{d(off)}$			7		
Turn-Off Fall Time		t_f			25		
Total Gate Charge		Q_g	V_{DS} = 480V, I_D = 1A V_{GS} = 10V (Note 4,5)		5		nC
Gate-Source Charge		Q_{gs}			1		
Gate-Drain Charge		Q_{gd}			2.6		
Diode Characteristics							
Diode Forward Voltage		V_{SD}	V_{GS} = 0V, I_S = 1 A			1.3	V
Diode Forward Current		I_S				1	A
Reverse Recovery Time		t_{rr}	V_{GS} = 0V, I_F = 1A dI_F/dt=100A/μs, (Note 1)		160		ns
Reverse Recovery Charge		Q_{rr}			0.3		μC

Notes: 1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L = 60mH, I_{AS} = 1A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C .
3. I_{SD} ≤ 1A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS} , Starting T_J = 25°C.
4. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle≤2%
5. Essentially Independent of Operating Temperature

Test Circuits And Waveforms

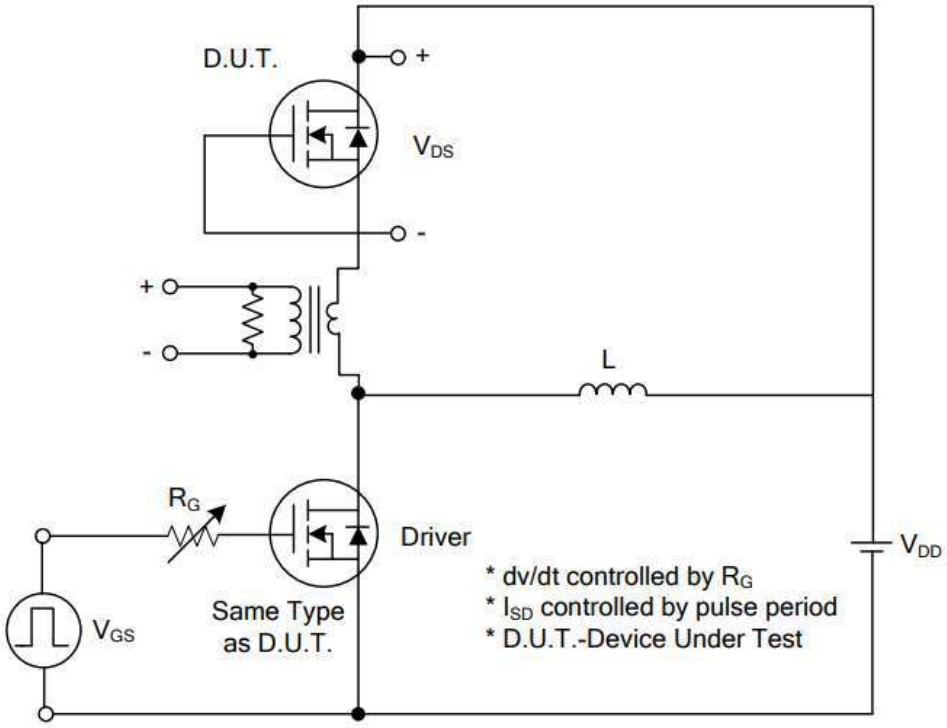


Figure 1A. Peak DiodeRecovery dv/dt Test Circuit

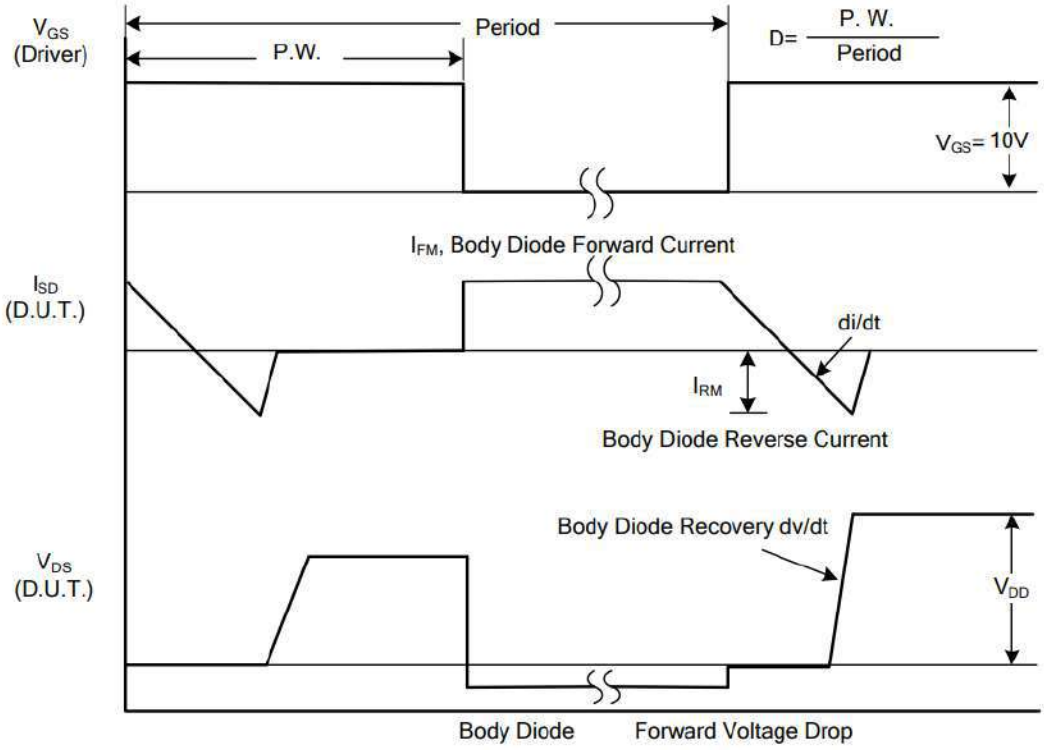


Figure 1B. Peak DiodeRecovery dv/dt Waveforms

Test Circuits And Waveforms

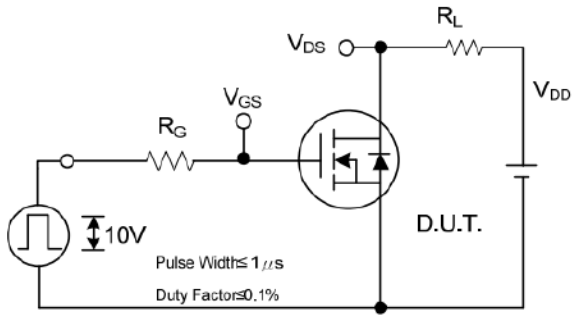


Figure 2A. Switching Test Circuit

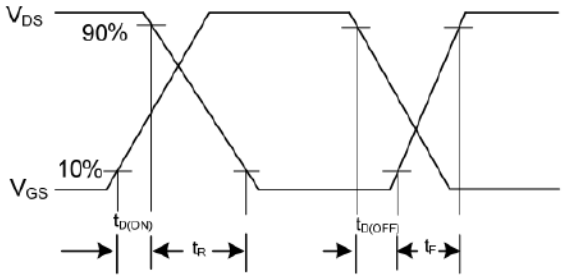


Figure 2B. Switching Waveforms

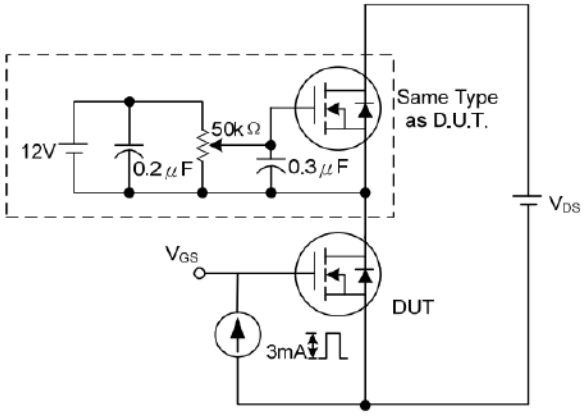


Figure 3A. Gate Charge Test Circuit

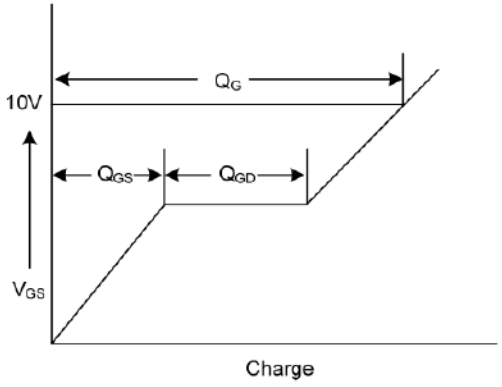


Figure 3B. Gate Charge Waveform

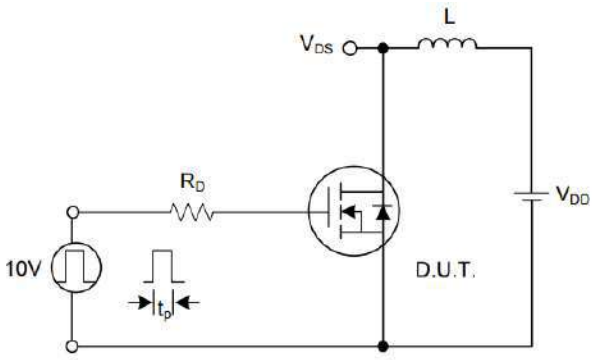


Figure 4A. Unclamped Inductive Switching Test Circuit

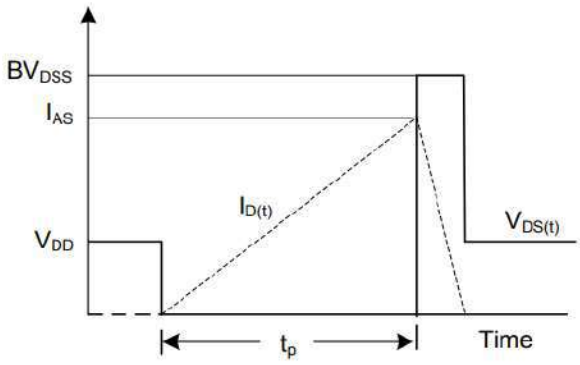


Figure 4B. Unclamped Inductive Switching Waveforms

Typical Characteristics

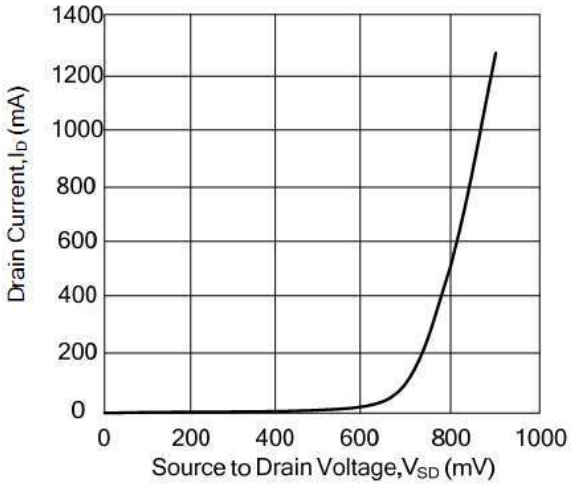


Figure 5.Drain Current vs.Source to Drain Volta0ge

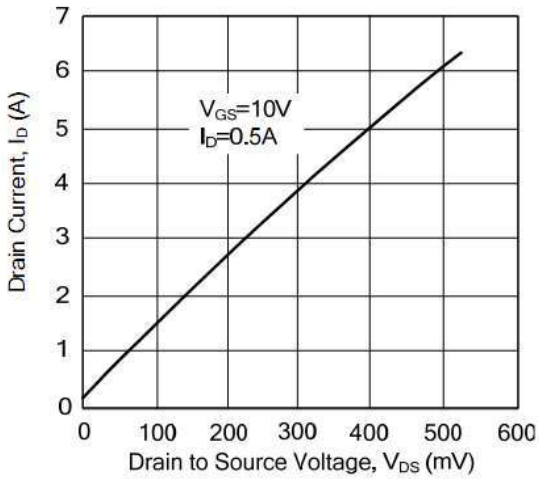


Figure 6. Drain-Source On-State Resistance Characteristics

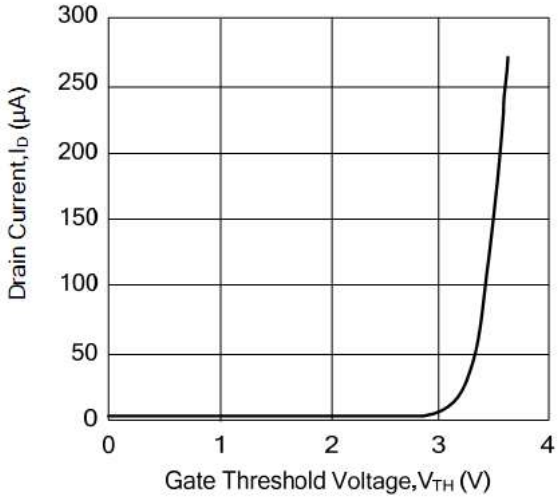


Figure 7. Drain Current vs. Gate Threshold Voltage

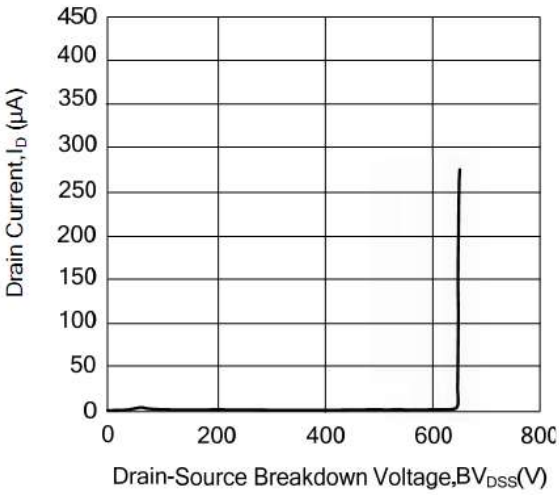
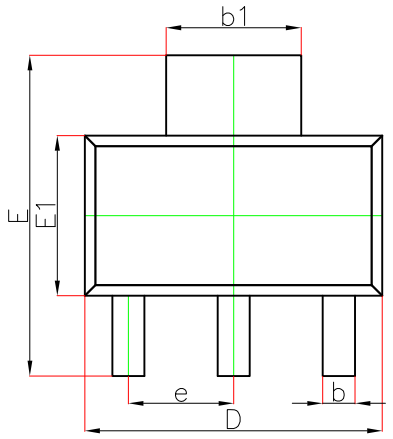
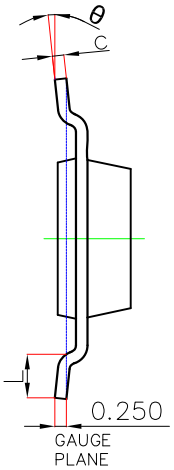
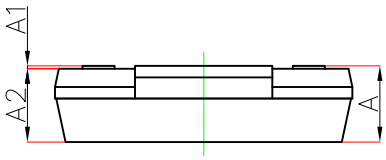


Figure 8. Drain Current vs. Drain-Source Breakdown Voltage

SOT-223 Package Outline Dimensions

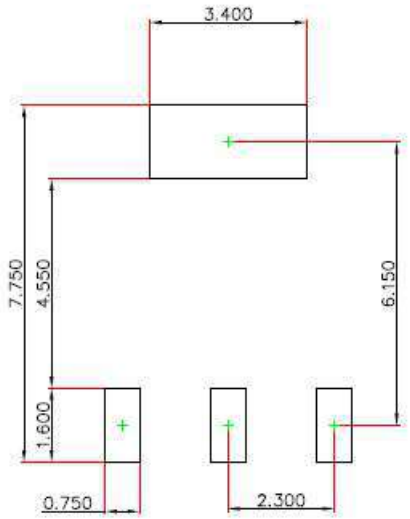






Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	——	1.800	——	0.071
A1	0.020	0.100	0.001	0.004
A2	1.500	1.700	0.059	0.067
b	0.660	0.840	0.026	0.033
b1	2.900	3.100	0.114	0.122
c	0.230	0.350	0.009	0.014
D	6.300	6.700	0.248	0.264
E	6.700	7.300	0.264	0.287
E1	3.300	3.700	0.130	0.146
e	2.300(BSC)		0.091(BSC)	
L	0.750	——	0.030	——
θ	0°	10°	0°	10°

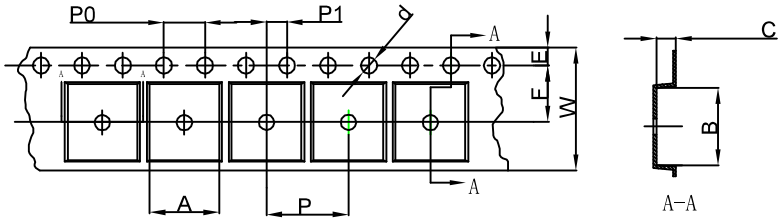
SOT-223 Suggested Pad Layout



Note:
1.Controlling dimension:in millimeters.
2.General tolerance:±0.050mm.
3.The pad layout is for reference purposes only.

SOT-223 Tape and Reel

SOT-223 Embossed Carrier Tape

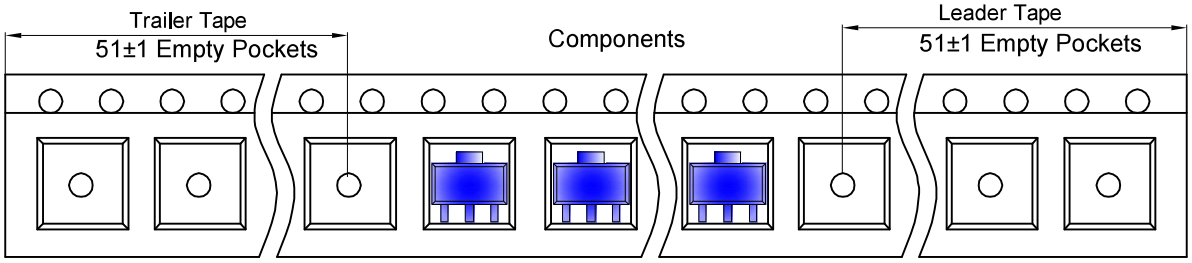


Packaging Description:

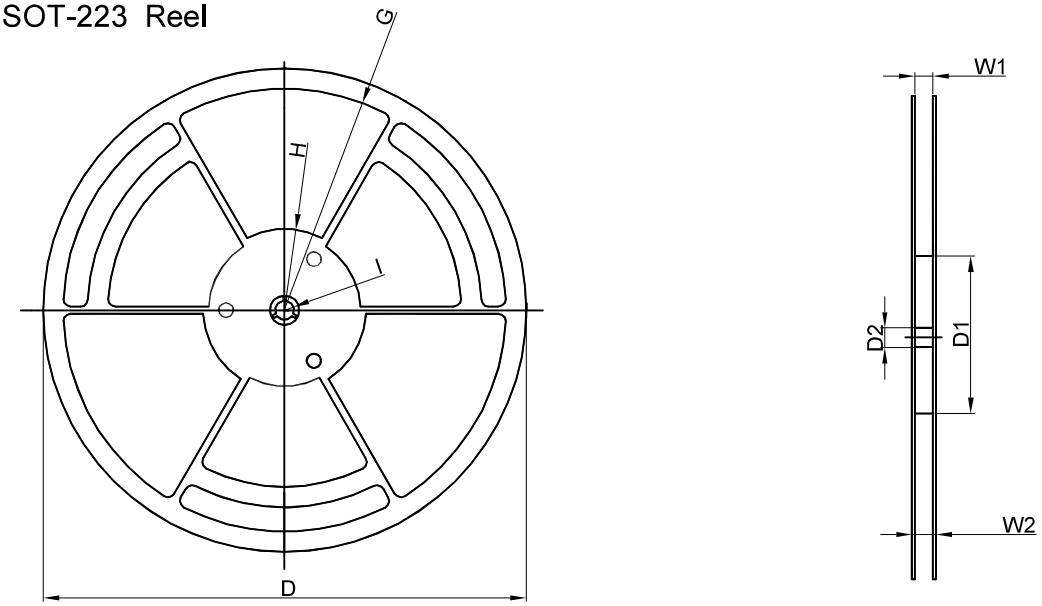
SOT-223 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 2,500 units per 13" or 33.0cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).

Dimensions are in millimeter										
Pkg type	A	B	C	d	E	F	P0	P	P1	W
SOT-223	6.765	7.335	1.88	Ø1.50	1.75	5.50	4.00	8.00	2.00	12.00

SOT-223 Tape Leader and Trailer



SOT-223 Reel



Dimensions are in millimeter								
Reel Option	D	D1	D2	G	H	I	W1	W2
13"Dia	Ø330.00	100.00	13.00	R151.00	R56.00	R6.50	12.40	17.60

REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
2,500 pcs	13 inch	2,500 pcs	336×336×48	20,000 pcs	445×355×365	