

TM15P02SI

P-Channel Enhancement Mosfet

General Description

- Low $R_{DS(ON)}$
- RoHS and Halogen-Free Compliant

Applications

- Load switch
- PWM

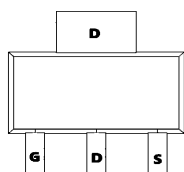
General Features

$V_{DS} = -20V$ $I_D = -15A$
 $R_{DS(ON)} = 12 m\Omega$ (typ.) @ $V_{GS} = -4.5V$

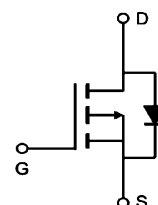
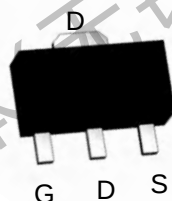
100% UIS Tested
100% R_g Tested



SI:SOT-89-3L



Marking:15P02



Absolute Maximum Ratings ($T_C = 25^\circ C$ Unless Otherwise Noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	Gate-Source Voltage	± 12	V
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ -4.5V$	-15	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ -4.5V$	-9	A
I_{DM}	Pulsed Drain Current ¹	-62	A
E_{AS}	Single pulse avalanche energy ²	28	mJ
P_D	Total Power Dissipation	2.8	W
T_{STG}	Storage Temperature Range	-55 to 175	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 175	$^\circ C$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient	---	62	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case	---	6.6	$^\circ C/W$

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Electrical Characteristics: ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV _{DSS}	Drain-Sourtce Breakdown Voltage	V _{GS} =0V, I _D =250 μ A	-20	---	---	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{GS} =0V, V _{DS} =-20V	---	---	-1	μ A
I _{GSS}	Gate-Source Leakage Current	V _{GS} =± 12V, V _{DS} =0A	---	---	± 100	nA
On Characteristics						
V _{GS(th)}	GATE-Source Threshold Voltage	V _{GS} =V _{DS} , I _D =250 μ A	-0.4	-0.65	-1.0	V
R _{DS(ON)}	Drain-Source On Resistance ⁴	V _{GS} =-4.5V, I _D =-10A	---	12	16	m Ω
		V _{GS} =-2.5V, I _D =-5A	---	16	20	m Ω
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =-10V, V _{GS} =0V, f=1MHz	---	1786	---	pF
C _{oss}	Output Capacitance		---	212	--	
C _{rss}	Reverse Transfer Capacitance		---	179	---	
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DS} =-10V, I _D =-10A, R _{ENG} =3 Ω, V _{GS} =-4.5V	---	7	---	ns
t _r	Rise Time		---	34	---	ns
t _{d(off)}	Turn-Off Delay Time		---	70	---	ns
t _f	Fall Time		---	69	---	ns
Q _g	Total Gate Charge	V _{GS} =-4.5V, V _{DS} =-10V, I _D =-10A	---	15	---	nc
Q _{gs}	Gate-Source Charge		---	3	---	nc
Q _{gd}	Gate-Drain “Miller” Charge		---	2	---	nc
Drain-Source Diode Characteristics						
V _{SD}	Diode Forward Voltage	V _{GS} =0V, I _{SD} =-15A	---	---	-1.2	V
I _S	Continuous Drain Curren	VD=VG=0V	---	---	-15	A
I _{SM}	Pulsed Drain Current		---	---	-62	A
Trr	Reverse Recovery Time	I _F =-10A, T _J =25℃	---	10	---	ns
Qrr	Reverse Recovery Charge	dI/dt=100A/us	---	3	---	nc

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
2. EAS condition: Starting $T_J=25^{\circ}\text{C}$, $V_{DD}=-15V$, $V_G=-10V$, $R_G=25\Omega$, $L=0.5mH$, $I_{AS}=-10A$
3. $R_{\theta JA}$ is measured with the device mounted on a 1inch² pad of 2oz copper FR4 PCB
4. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$.



TM15P02SI

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Typical Characteristics

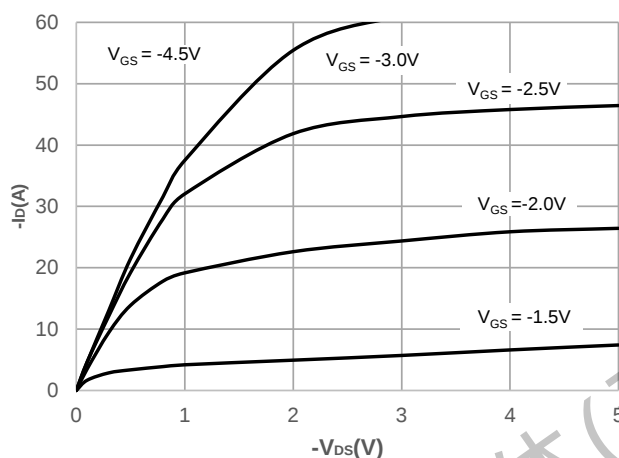


Figure 1: Output Characteristics

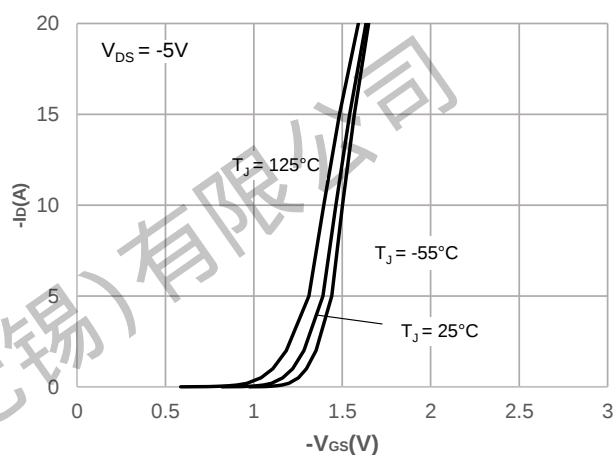


Figure 2: Typical Transfer Characteristics

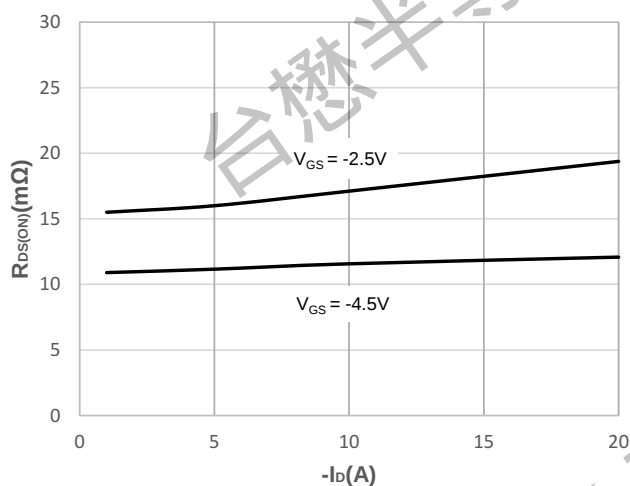


Figure 3: On-resistance vs. Drain Current

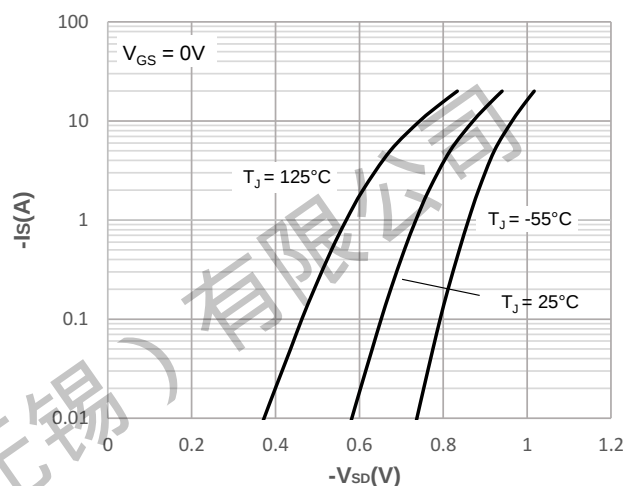


Figure 4: Body Diode Characteristics

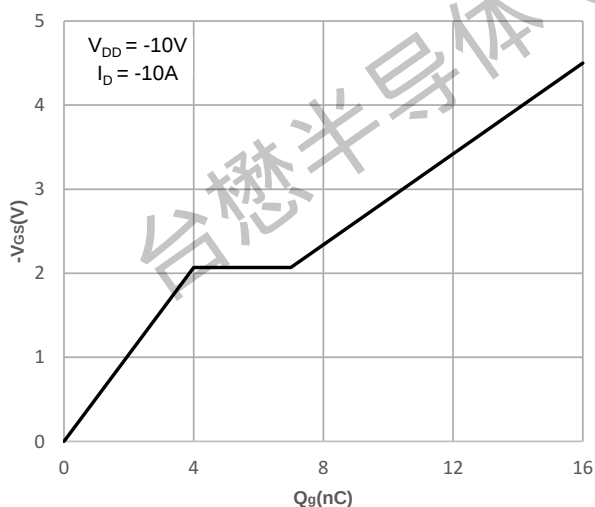


Figure 5: Gate Charge Characteristics

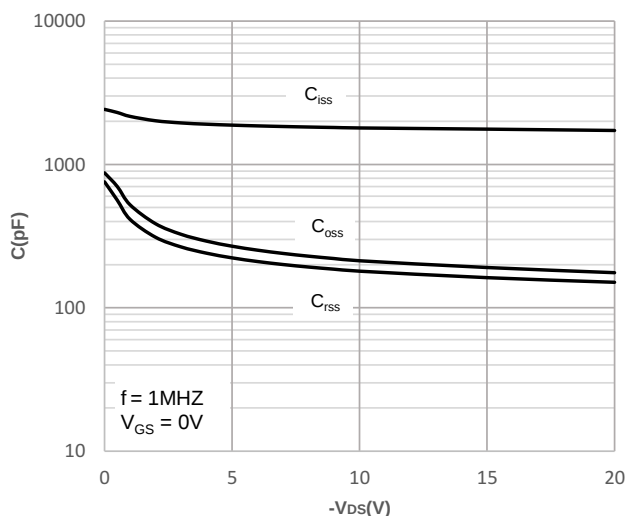


Figure 6: Capacitance Characteristics

TM15P02SI

P-Channel Enhancement Mosfet

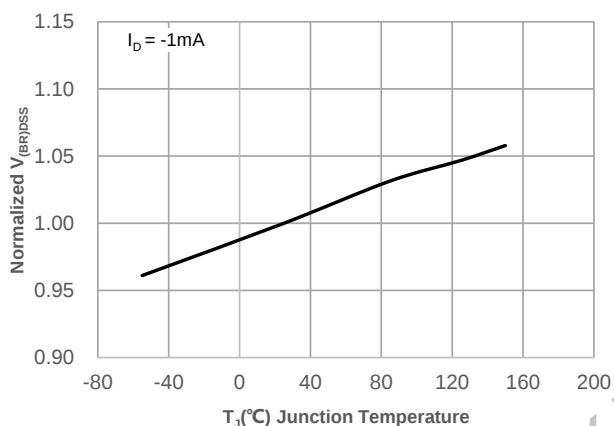


Figure 7: Normalized Breakdown voltage vs. Junction Temperature

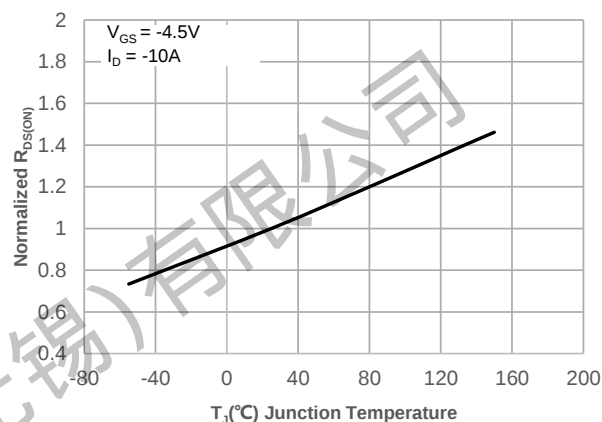


Figure 8: Normalized on Resistance vs. Junction Temperature

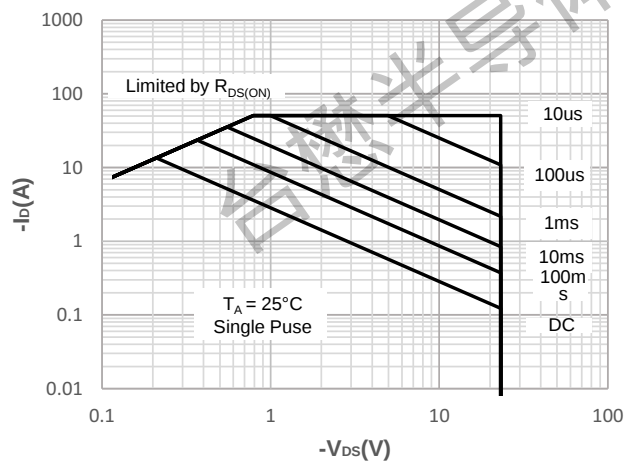


Figure 9: Maximum Safe Operating Area

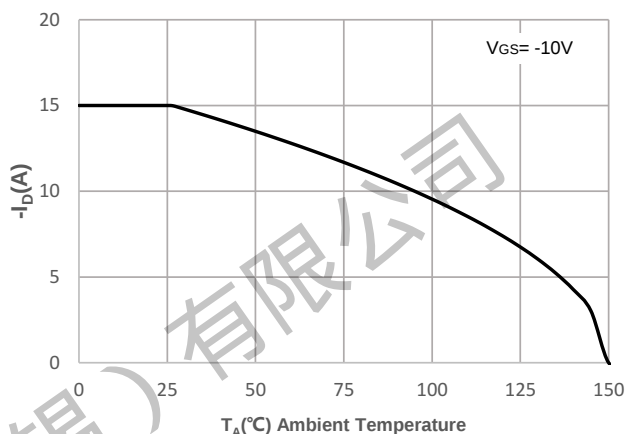


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

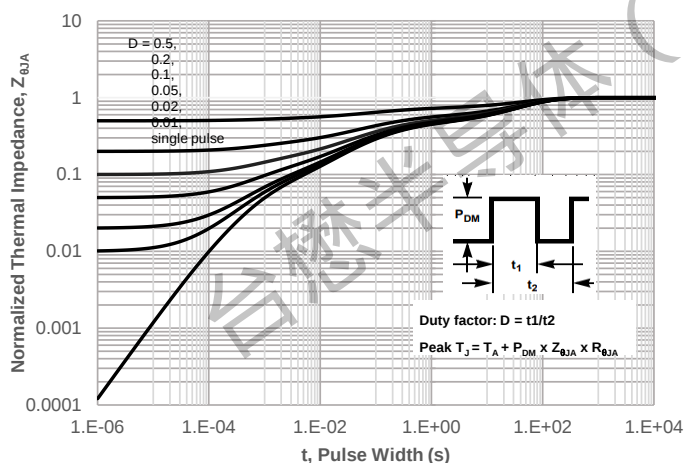


Figure 11: Normalized Maximum Transient Thermal Impedance

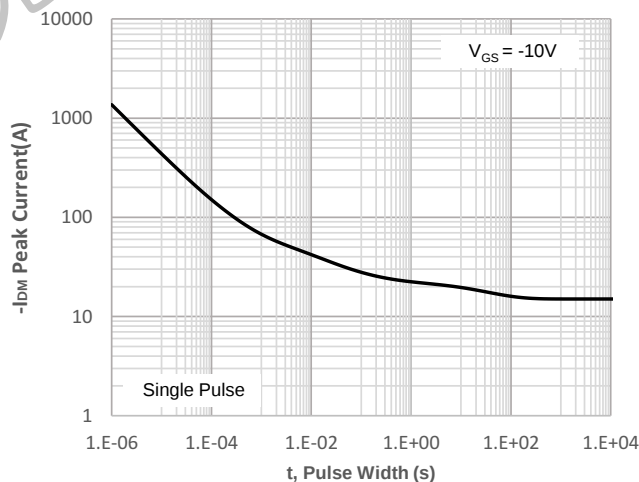
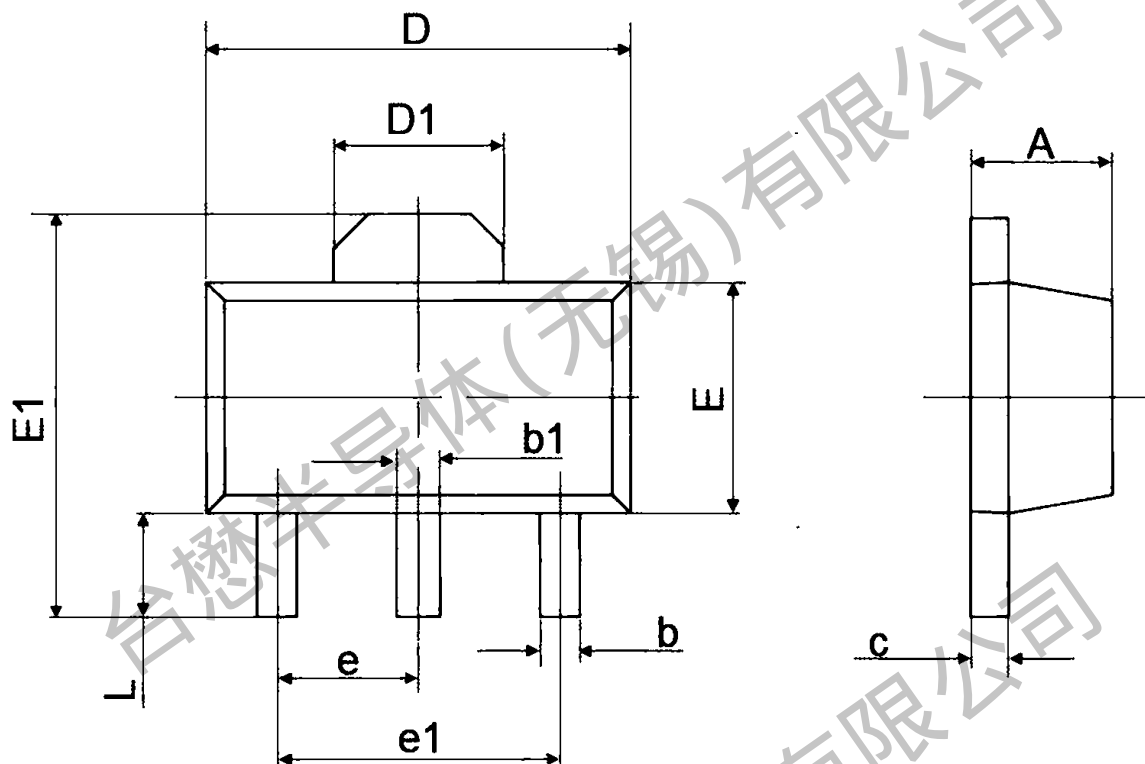


Figure 12: Peak Current Capacity

TM15P02SI

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Package Mechanical Data:SOT-89-3L

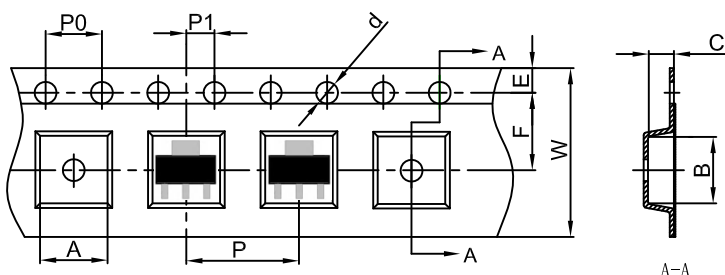


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF.		0.061 REF.	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP.		0.060 TYP.	
e1	3.000 TYP.		0.118 TYP.	
L	0.900	1.200	0.035	0.047

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SOT-89-3L Embossed Carrier Tape



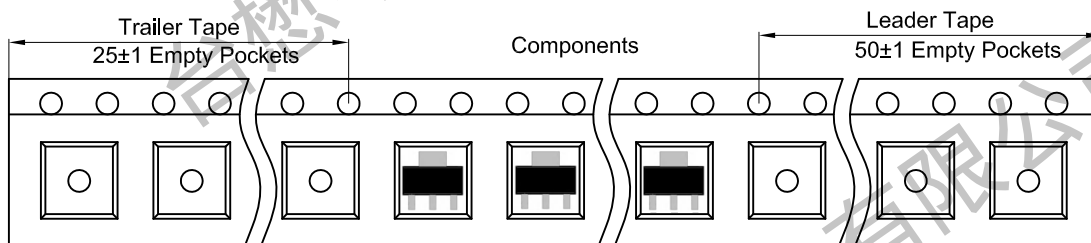
Packaging Description:

SOT-89-3L 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 1,000 units per 7" or 18.0 cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).

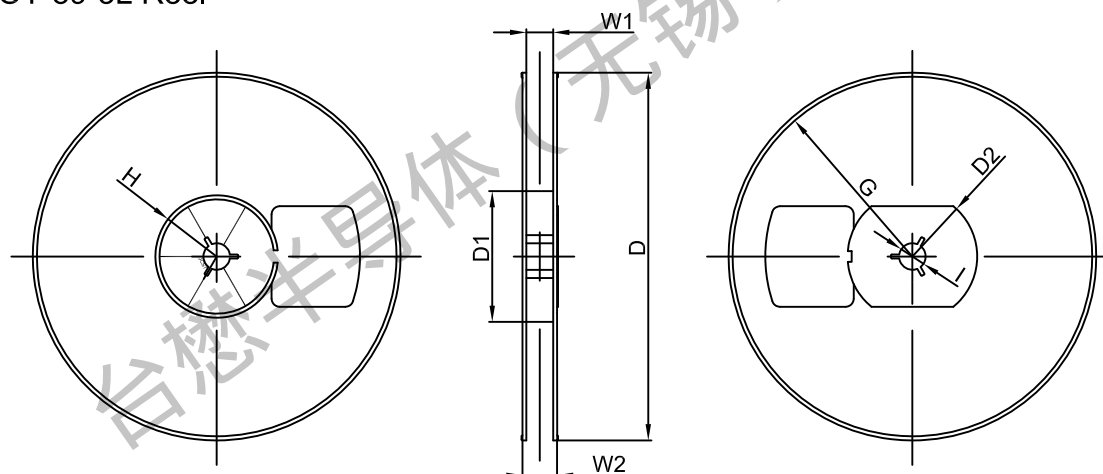
ALL DIM IN mm

Dimensions are in millimeter										
Pkg type	A	B	C	d	E	F	P0	P	P1	W
SOT-89-3L	4.85	4.45	1.85	Ø1.50	1.75	5.50	4.00	8.00	2.00	12.00

SOT-89-3L Tape Leader and Trailer



SOT-89-3L Reel



Dimensions are in millimeter								
Reel Option	D	D1	D2	G	H	I	W1	W2
7"Dia	Ø180.00	60.00	R32.00	R86.50	R30.00	Ø13.00	13.20	16.50

REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
1000 pcs	7 inch	10,000 pcs	205×195×220	40,000 pcs	430×415×240	

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Revision history:

Date	Rev	Description	Page
2023.06.30	23.06	Original	