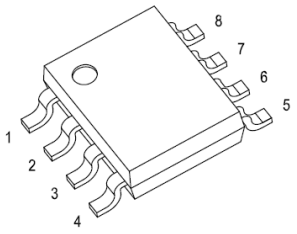
GP60NP90Q

60V N-Channel + P-Channel MOSFET

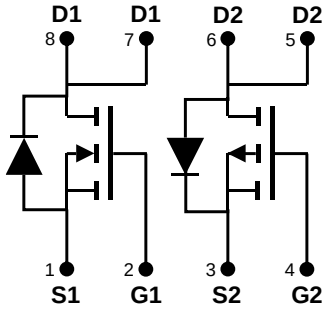
Product Summary

$V_{(BR)DSS}$	$R_{DS(on)\ TYP}$	I_D
60V	70mΩ@10V	3A
	82mΩ@4.5V	
-60V	160mΩ@-10V	-2A
	185mΩ@-4.5V	

SOP-8



Schematic diagram



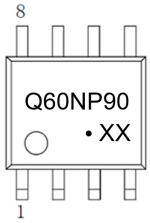
Feature

- Low drain-source ON-resistance
- High forward transfer admittance
- Low leakage current

Application

- Low voltage applications

MARKING:



Q60NP90 = Device

Code XX = Date Code

Solid dot = Green Device

ABSOLUTE MAXIMUM RATINGS (T_a=25℃ unless otherwise noted)

Parameter	Symbol	Value	Unit	Test Condition
N-MOSFET				
Drain-Source Voltage	V_{DS}	60	V	
Gate-Source Voltage	V_{GS}	±20	V	
Continuous Drain Current(1)	I_D	3	A	T_A =25℃
Pulsed Drain Current	I_{DM}	10	A	
P-MOSFET				
Drain-Source Voltage	V_{DS}	-60	V	
Gate-Source Voltage	V_{GS}	±20	V	
Continuous Drain Current	I_D	-2	A	T_A =25℃
Pulsed Drain Current(1)	I_{DM}	-6	A	
Temperature and Thermal Resistance				
Thermal Resistance(2)	$R_{\theta JA}$	89	℃/W	from Junction to Ambient
Power Dissipation	P_D	1.4	W	T_A =25℃
Junction Temperature	T_J	150	℃	
Storage Temperature	T_{STG}	-55~ +150	℃	

N-channel MOSFET ELECTRICAL CHARACTERISTICS(T_a=25℃ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D =250μA	60			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =60V,V_{GS} = 0V			1	μA
Gate-body leakage current	I_{GSS}	V_{GS} =±20V, V_{DS} = 0V			±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =250μA	0.5	1.3	2.0	V
Drain-source on-resistance(3)	$R_{DS(on)}$	V_{GS} =10V, I_D =3A		70	90	mΩ
		V_{GS} =4.5V, I_D =3A		82	120	
Forward tranconductance	g_{FS}	V_{DS} =15V, I_D =2A	1.4	2.5		S
Diode Forward voltage(3)	V_{SD}	I_S=3A, V_{GS} = 0V			1.2	V
Dynamic characteristics(4)						
Input Capacitance	C_{iss}	V_{DS}=30V,V_{GS}=0V, F=1.0MHz		250		pF
Output Capacitance	C_{oss}			26		
Reverse Transfer Capacitance	C_{rss}			20		
Total gate charge	Q_g	V_{DS}=30V,I_D=3A,V_{GS}=4.5V		7		nC
Gate-source charge	Q_{gs}			1.2		
Gate-drain charge	Q_{gd}			1.5		
Switching Characteristics(4)						
Turn-on delay time	$t_{d(on)}$	V_{DD}=30V, I_D=1.5A V_{GS}=10V,R_{GEN}=1Ω		6.5		ns
Turn-on rise time	t_r			15.2		
Turn-off delay time	$t_{d(off)}$			14.7		
Turn-off fall time	t_f			10.3		

P-channel MOSFET ELECTRICAL CHARACTERISTICS(T_a=25℃ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D =-250μA	-60			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =-60V,V_{GS} = 0V			-1	μA
Gate-body leakage current	I_{GSS}	V_{GS} =±20V, V_{DS} = 0V			±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =-250μA	-1.0	-1.7	-2.5	V
Drain-source on-resistance(3)	$R_{DS(on)}$	V_{GS} =-10V, I_D =-1.5A		160	195	mΩ
		V_{GS} =-4.5V, I_D =-1.5A		185	240	
Forward tranconductance	g_{FS}	V_{DS} =-15V, I_D =-1.5A	1			S
Diode forward voltage(3)	V_{SD}	I_S=-1.5A, V_{GS} = 0V			-1.2	V
Dynamic characteristics(4)						
Input Capacitance	C_{iss}	V_{DS}=-30V,V_{GS}=0V, F=1.0MHz		380		pF
Output Capacitance	C_{oss}			32		
Reverse Transfer Capacitance	C_{rss}			6		
Total gate charge	Q_g	V_{DS}=-30V,I_D=-1.5A,V_{GS}=-10V		12		nC
Gate-source charge	Q_{gs}			4		
Gate-drain charge	Q_{gd}			3.9		
Switching Characteristics(4)						
Turn-on delay time	$t_{d(on)}$	V_{DD}=-30V,I_D=-1A V_{GS}=-10V,R_{GEN}=3Ω		45		nS
Turn-on rise time	t_r			38		
Turn-off delay time	$t_{d(off)}$			18		
Turn-off fall time	t_f			15		

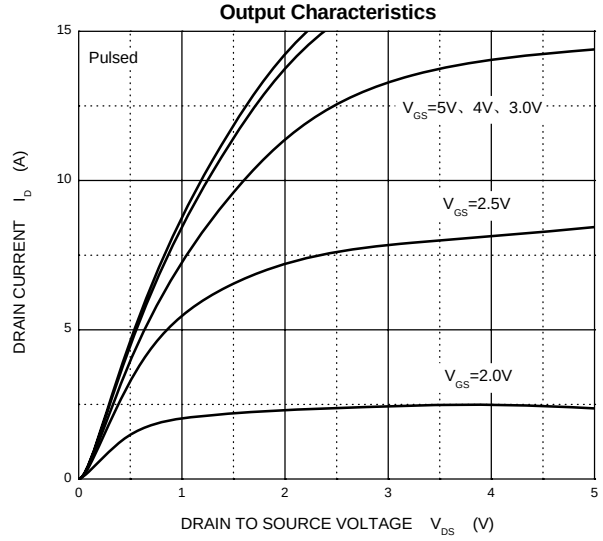
Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t < 5 sec.
3. Pulse Test : Pulse Width≤300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production testing.

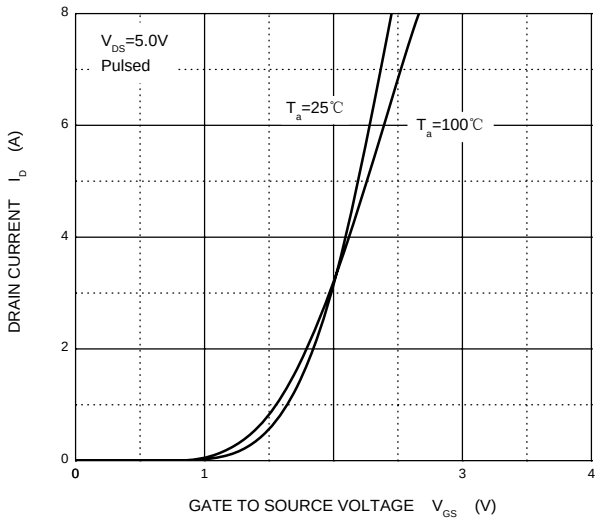
Typical Electrical and Thermal Characteristics

N-Channel MOS

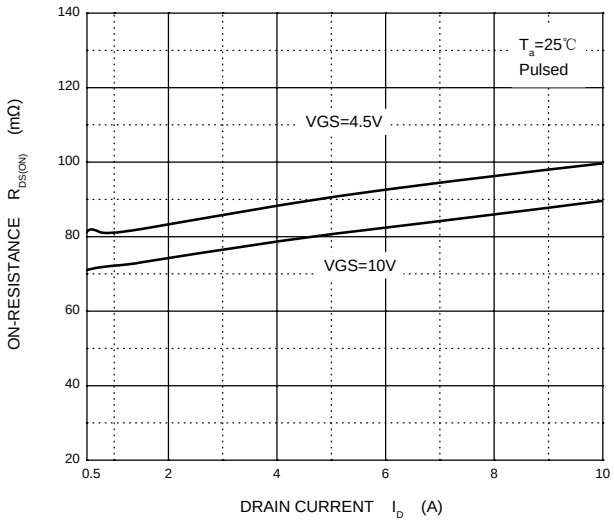
Output Characteristics



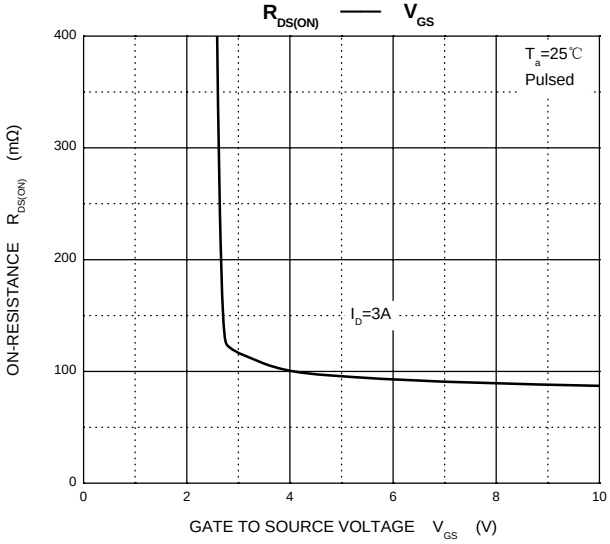
Transfer Characteristics



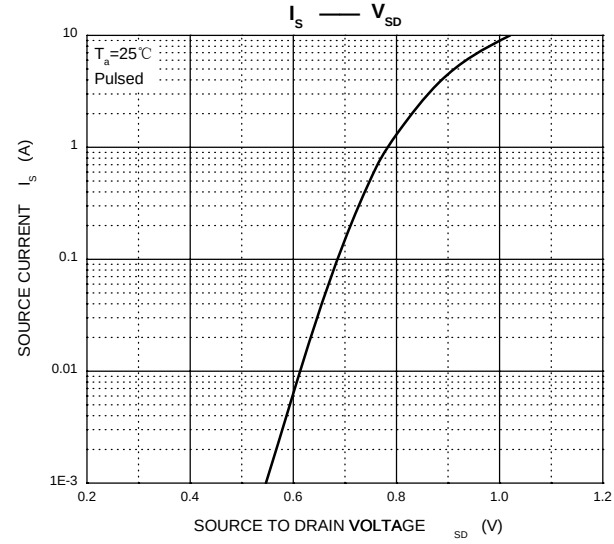
$R_{DS(ON)}$ —— I_D



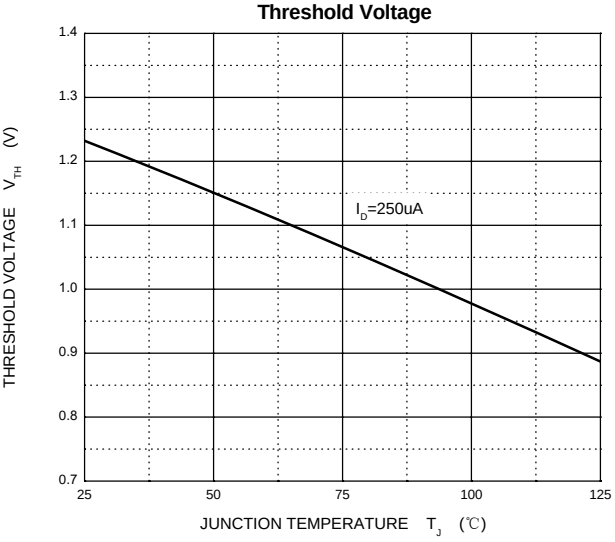
$R_{DS(ON)}$ —— V_{GS}



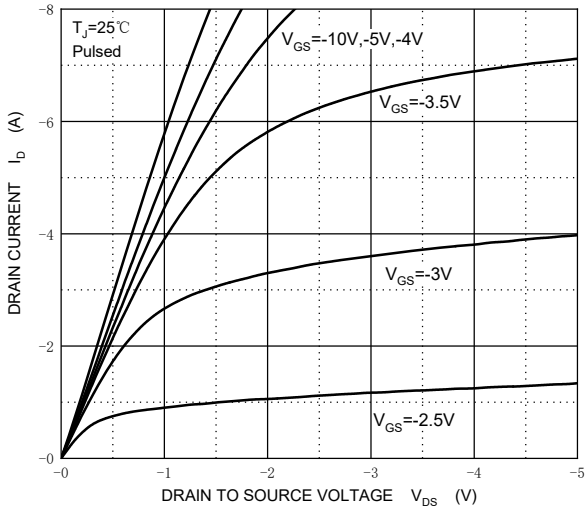
I_S —— V_{SD}



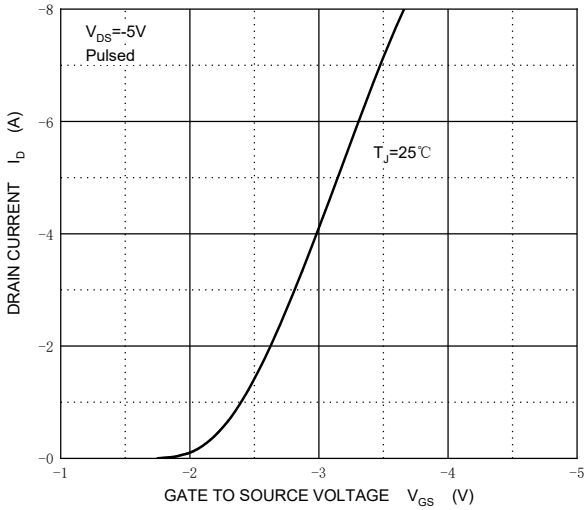
Threshold Voltage



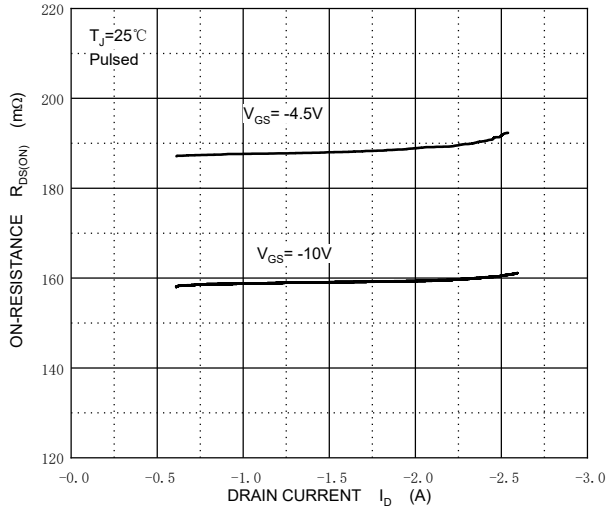
Output Characteristics



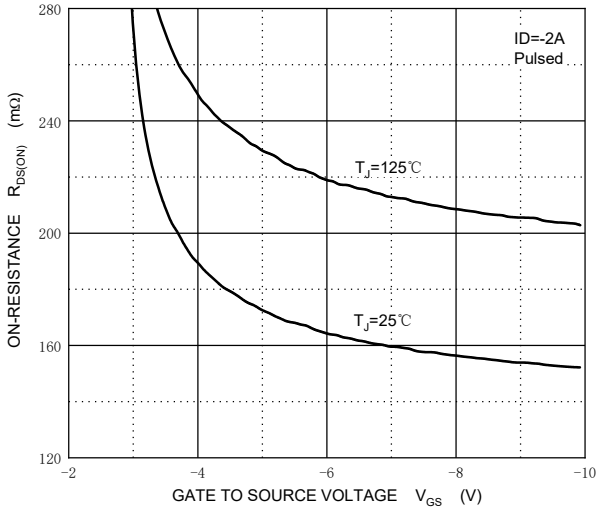
Transfer Characteristics



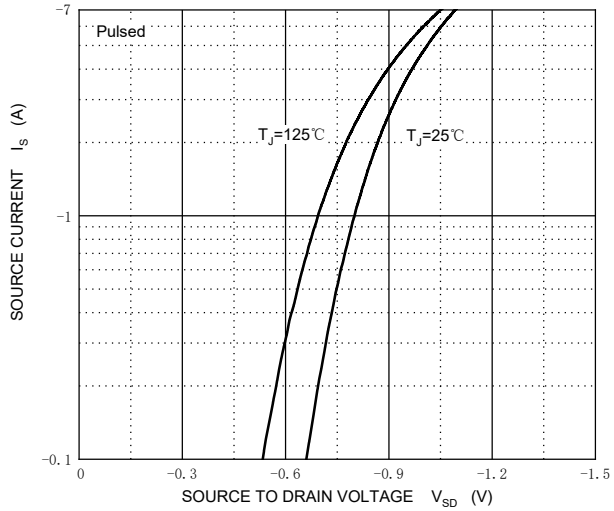
$R_{DS(ON)}$ — I_D



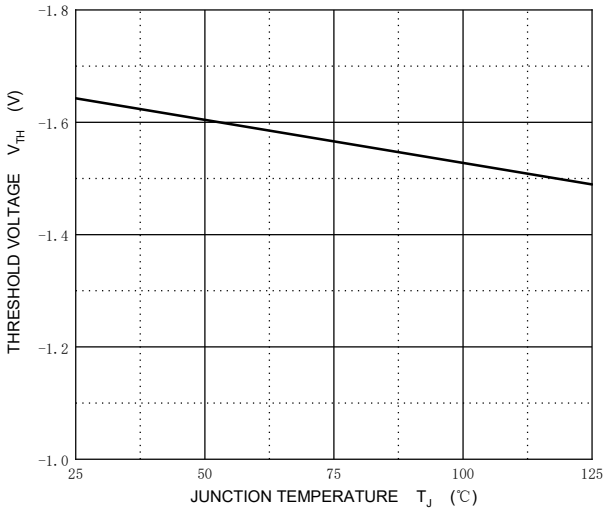
$R_{DS(ON)}$ — V_{GS}



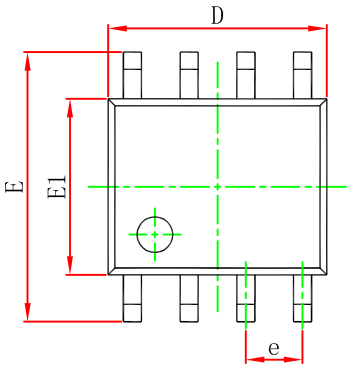
I_S — V_{SD}

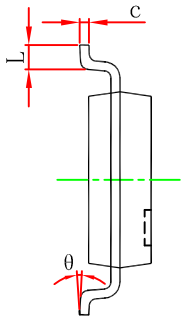


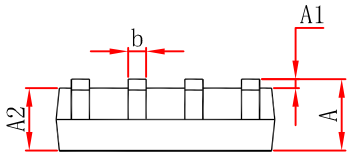
Threshold Voltage



SOP-8 Package Information



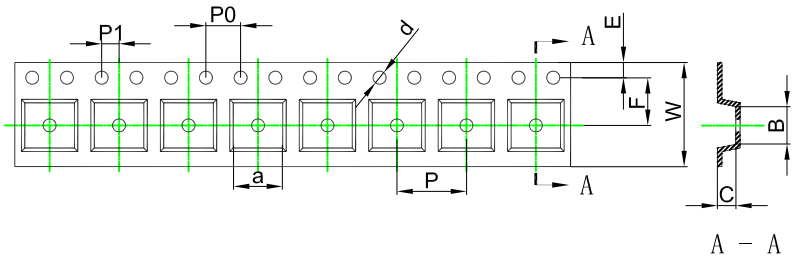




Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	**Max**	**Min**	**Max**
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.800	5.000	0.189	0.197
e	1.270（BSC）		0.050（BSC）	
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

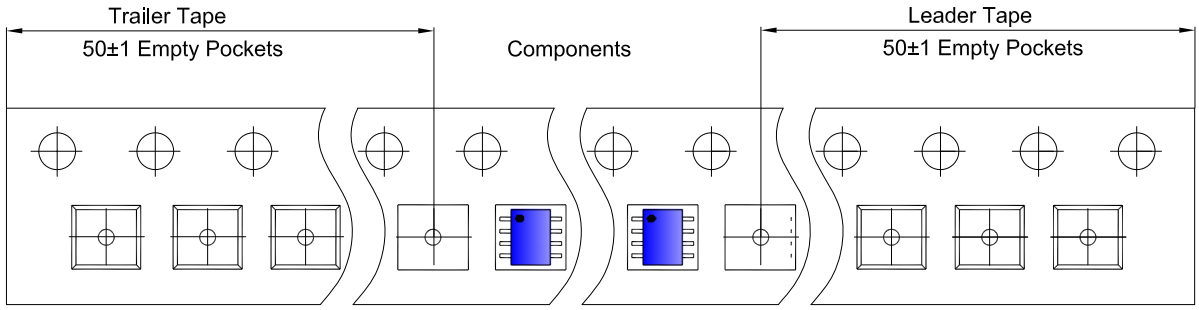
SOP-8 Tape and Reel

SOP8 Embossed Carrier Tape

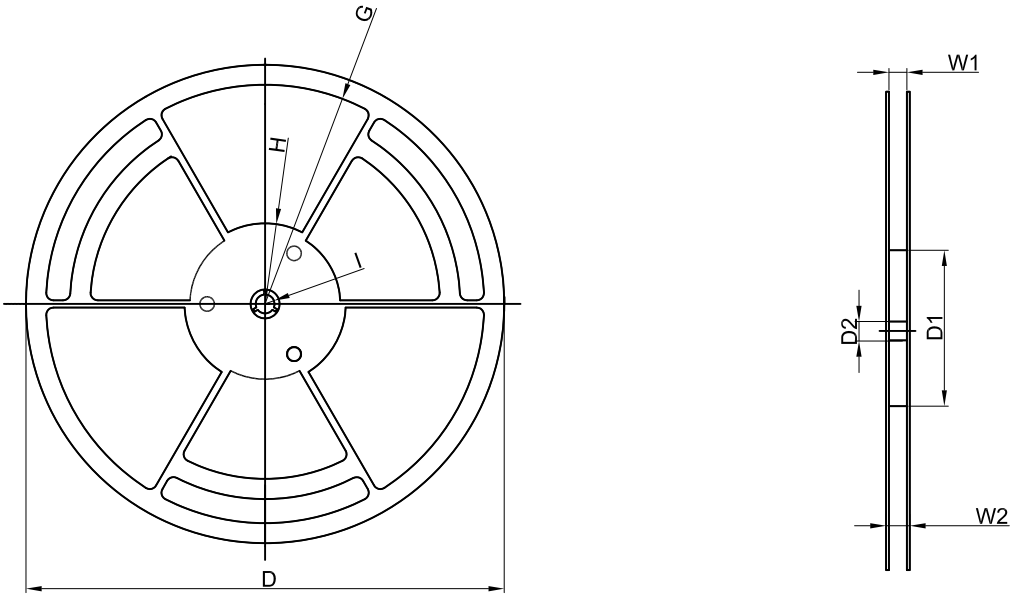


Dimensions are in millimeter										
Pkg type	a	B	C	d	E	F	P0	P	P1	W
SOP8	6.40	5.40	2.10	Ø1.50	1.75	5.50	4.00	8.00	2.00	12.00

SOP8 Tape Leader and Trailer



SOP8 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)
4,000 pcs	13 inch	8,000 pcs	360×360×65	64,000 pcs	565×380×390	