



ALPHA & OMEGA
SEMICONDUCTOR, INC.

July 2001

AO6800

Dual N-Channel Enhancement Mode Field Effect Transistor

General Description

The AO6800 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.

Features

V_{DS} (V) = 30V

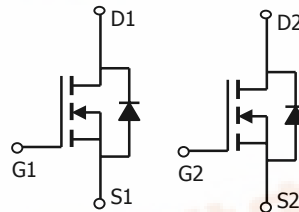
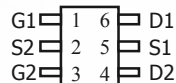
I_D = 3.4 A

$R_{DS(ON)} < 60m\Omega$ ($V_{GS} = 10V$)

$R_{DS(ON)} < 75m\Omega$ ($V_{GS} = 4.5V$)

$R_{DS(ON)} < 115m\Omega$ ($V_{GS} = 2.5V$)

TSOP6
Top View



Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 12	V
Continuous Drain Current ^A	I_D	3.4	A
$T_A=25^\circ\text{C}$			
$T_A=70^\circ\text{C}$		2.7	
Pulsed Drain Current ^B	I_{DM}	20	
Power Dissipation ^A	P_D	1.15	W
$T_A=25^\circ\text{C}$			
$T_A=70^\circ\text{C}$		0.73	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ\text{C}$

Thermal Characteristics each FET

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	78	110	$^\circ\text{C/W}$
$t \leq 10s$				
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	106	150	$^\circ\text{C/W}$
Steady-State				
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	64	80	$^\circ\text{C/W}$
Steady-State				



Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV _{DSS}	Drain-Source Breakdown Voltage	I _D =250μA, V _{GS} =0V	30			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =24V, V _{GS} =0V T _J =55°C			1 5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±12V			100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	0.6	1	1.4	V
I _{D(ON)}	On state drain current	V _{GS} =4.5V, V _{DS} =5V	20			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =3.4A T _J =125°C		50 66	60 80	mΩ
		V _{GS} =4.5V, I _D =3A		60	75	mΩ
		V _{GS} =2.5V, I _D =2A		88	115	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =3A		7.8		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.8	1	V
I _S	Maximum Body-Diode Continuous Current				1.5	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, f=1MHz		390		pF
C _{oss}	Output Capacitance			54.5		pF
C _{rss}	Reverse Transfer Capacitance			41		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		3		Ω
SWITCHING PARAMETERS						
Q _g	Total Gate Charge	V _{GS} =4.5V, V _{DS} =15V, I _D =3.4A		4.96		nC
Q _{gs}	Gate Source Charge			0.8		nC
Q _{gd}	Gate Drain Charge			1.72		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =15V, R _L =4.7Ω, R _{GEN} =6Ω		6.8		ns
t _r	Turn-On Rise Time			3.6		ns
t _{D(off)}	Turn-Off DelayTime			35.2		ns
t _f	Turn-Off Fall Time			13.7		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =3.4A, dI/dt=100A/μs		11.4		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =3.4A, dI/dt=100A/μs		6		nC

A: The value of R_{θJA} is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The value in any a given application depends on the user's specific board design. The current rating is based on the t_s ≤ 10s thermal resistance rating.

B: Repetitive rating, pulse width limited by junction temperature.

C. The R_{θJA} is the sum of the thermal impedance from junction to lead R_{θJL} and lead to ambient.

D. The static characteristics in Figures 1 to 6,12,14 are obtained using 80μs pulses, duty cycle 0.5% max.

E. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The SOA curve provides a single pulse rating.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

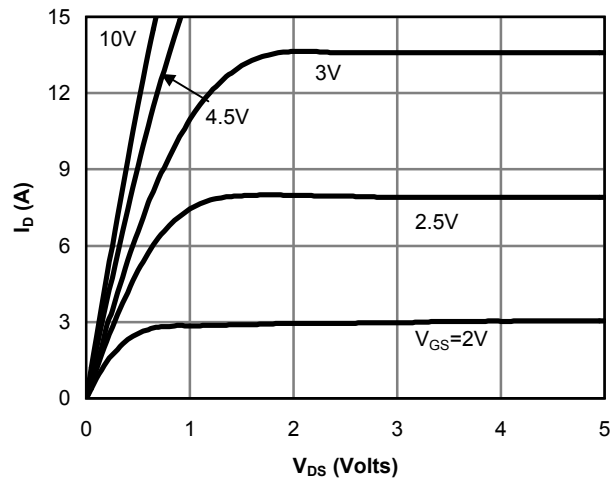


Fig 1: On-Region Characteristics

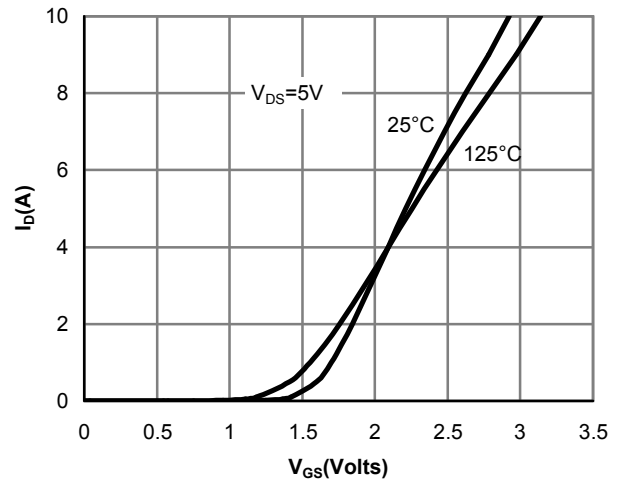


Figure 2: Transfer Characteristics

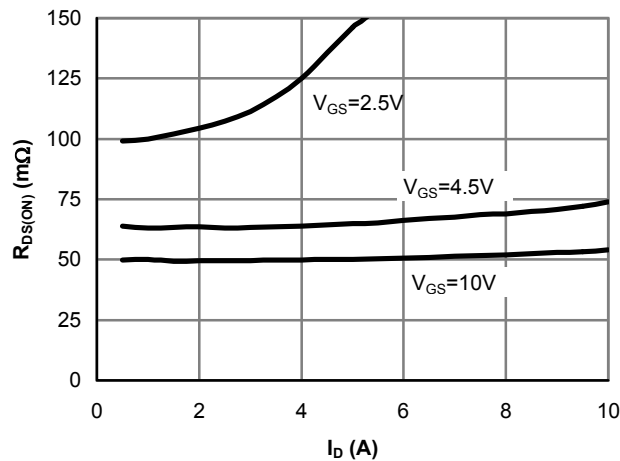


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

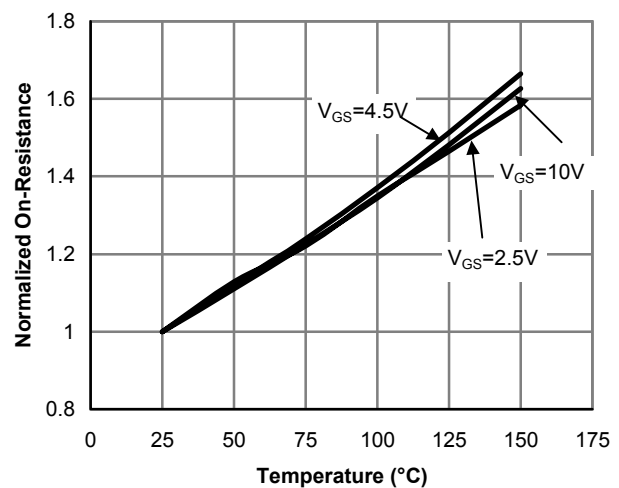


Figure 4: On-Resistance vs. Junction Temperature

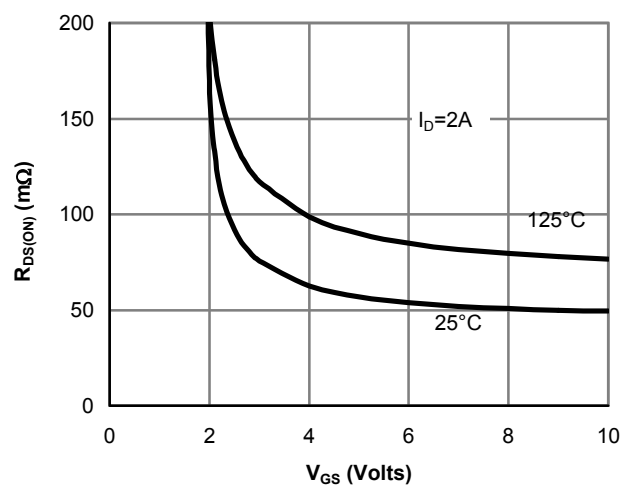


Figure 5: On-Resistance vs. Gate-Source Voltage

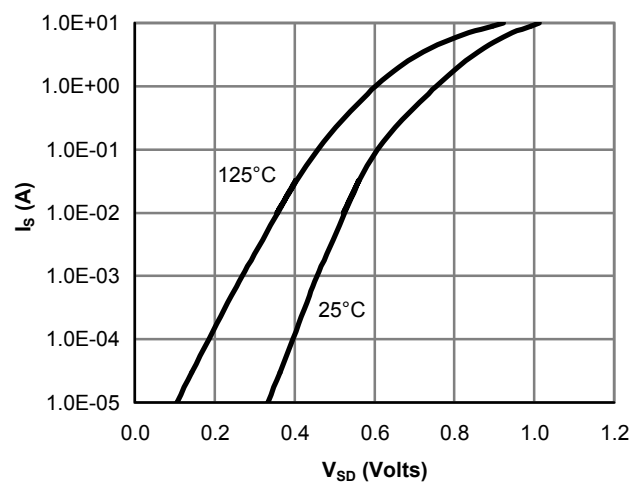


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

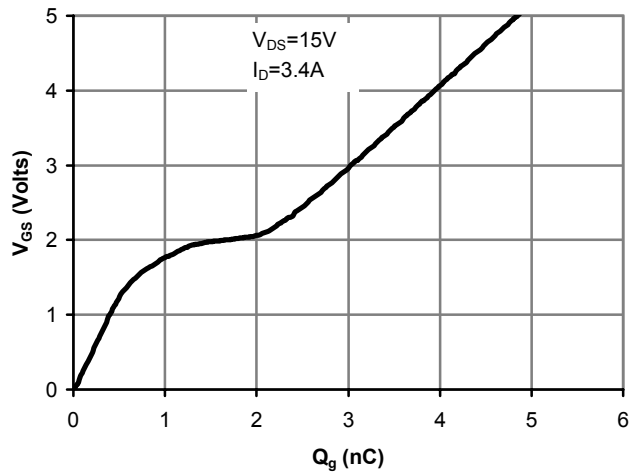


Figure 7: Gate-Charge Characteristics

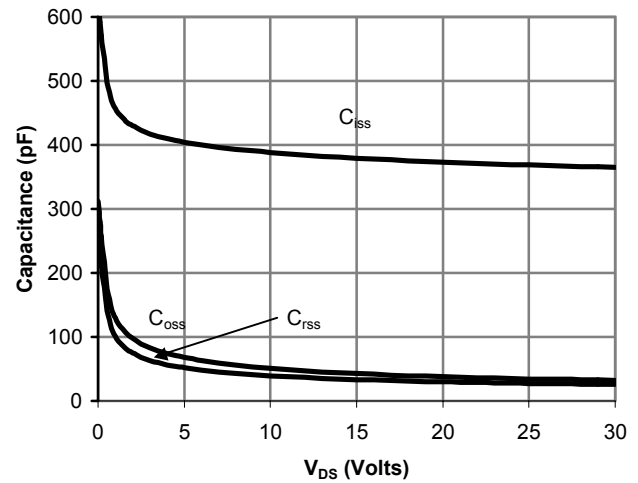


Figure 8: Capacitance Characteristics

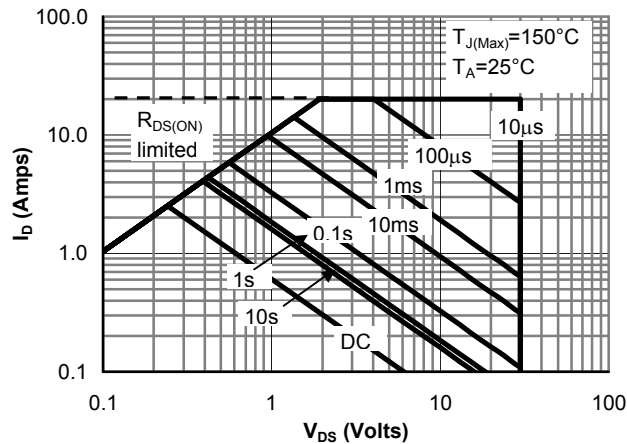


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

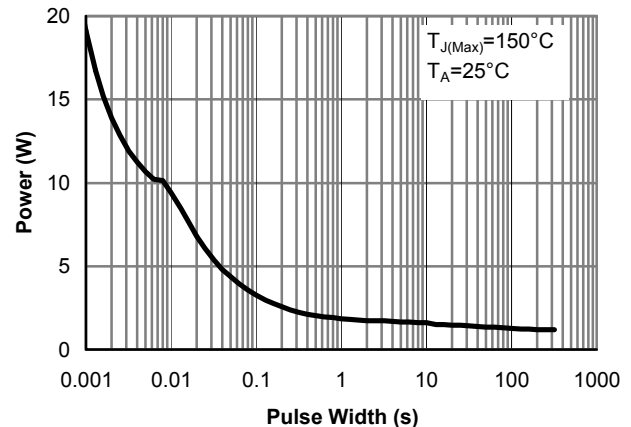


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

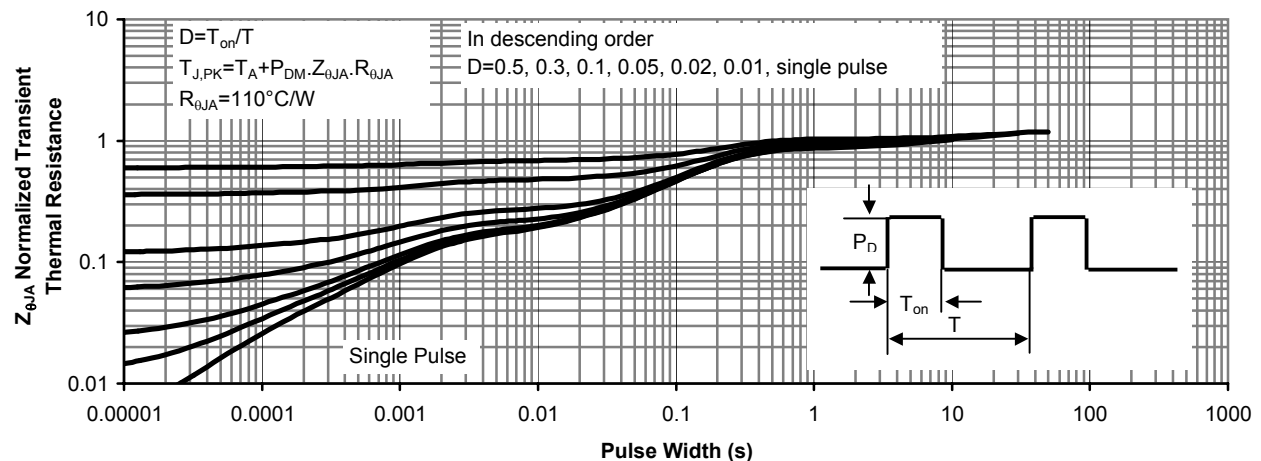
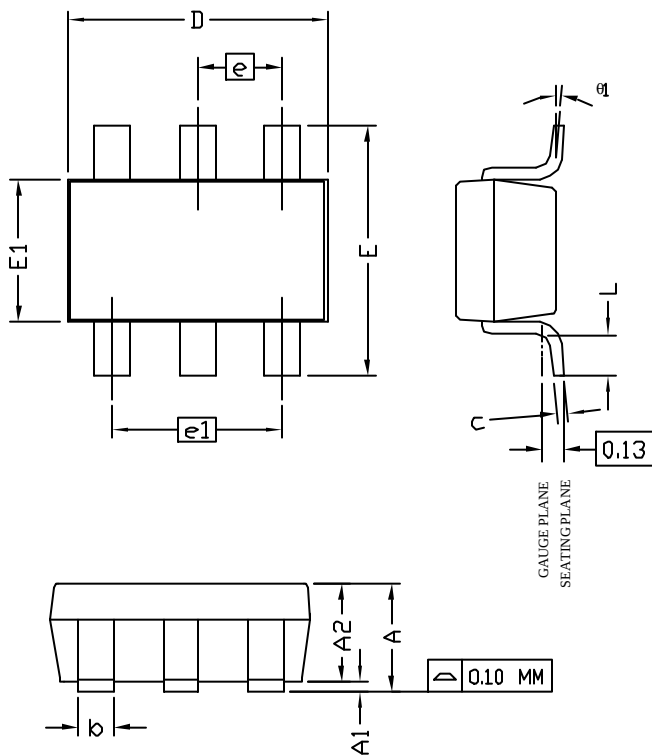


Figure 11: Normalized Maximum Transient Thermal Impedance



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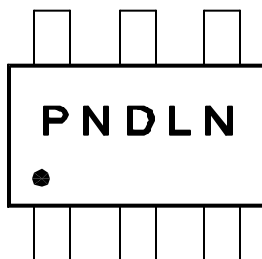
TSOP-6 Package Data



SYMBOLS	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	1.00	—	1.25
A1	0.00	—	0.10
A2	1.00	1.10	1.15
b	0.35	0.40	0.50
c	0.10	0.13	0.20
D	2.70	2.90	3.10
E	2.60	2.80	3.00
E1	1.60	1.80	2.00
e	0.95 BSC		
e1	1.90 BSC		
L	0.37	—	—
θ1	1°	5°	8°

NOTE:
1. LEAD FINISH: 150 MICROINCHES (3.8 μm) MIN.
THICKNESS OF Tin/Lead (SOLDER) PLATED ON LEAD
2. TOLERANCE ±0.100 mm (4 mil) UNLESS OTHERWISE SPECIFIED
3. COPLANARITY : 0.1000 mm
4. DIMENSION L IS MEASURED IN GAGE PLANE

PACKAGE MARKING DESCRIPTION

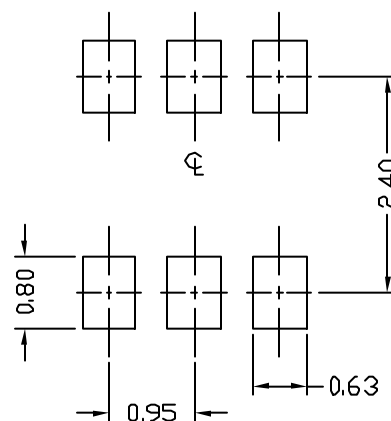


TSOP-6 PART NO. CODE

PART NO.	CODE
AO6800	H0

NOTE:
P N - PART NUMBER CODE.
D - YEAR AND WEEK CODE.
L N - ASSEMBLY LOT CODE, FAB AND ASSEMBLY LOCATION CODE.

RECOMMENDED LAND PATTERN

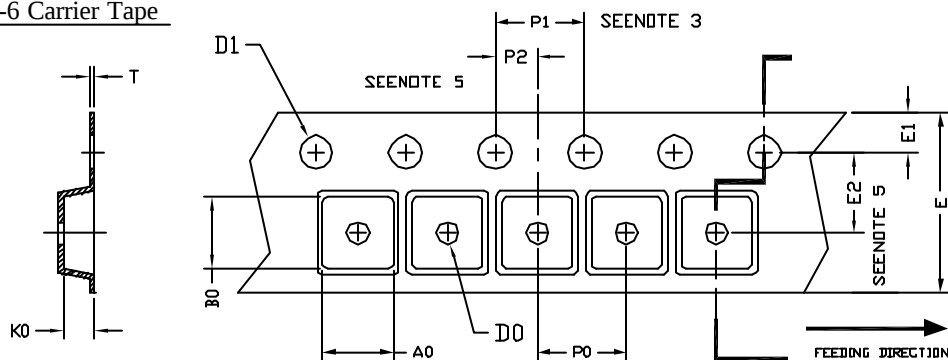




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TSOP-6 Tape and Reel Data

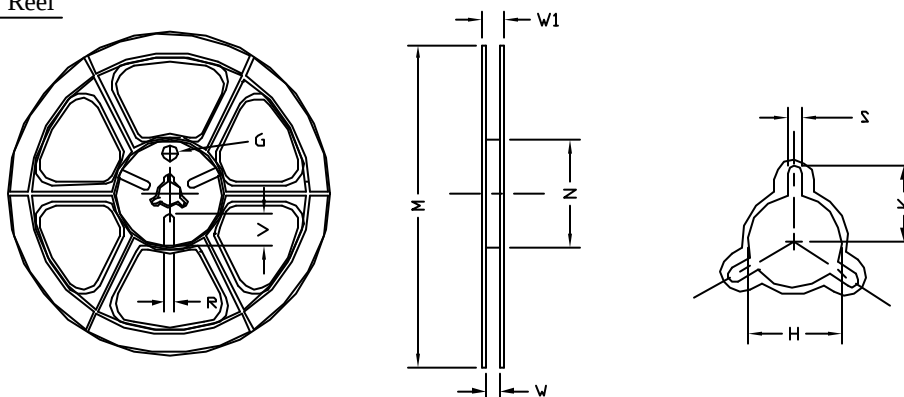
TSOP-6 Carrier Tape



UNIT: MM

PACKAGE	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
SDT-23 (B mm)	3.15 ±0.10	3.27 ±0.10	1.34 ±0.10	1.10 ±0.01	1.30 ±0.10	8.00 ±0.20	1.75 ±0.10	3.50 ±0.05	4.00 ±0.10	4.00 ±0.10	2.00 ±0.10	0.25 ±0.05

TSOP-6 Reel



UNIT: MM

TAPE SIZE	REEL SIZE	M	N	W	W1	H	K	S	G	R	V
8 mm	Ø180	Ø180.00 ±0.50	Ø60.50	9.00 ±0.30	11.40 ±1.00	Ø13.00 +0.50 -0.20	10.60	2.00 ±0.50	Ø9.00	5.00	18.00

TSOP-6 Tape

Leader / Trailer
& Orientation

