

P-Channel MOSFET

RoHS Device
Halogen Free



Features

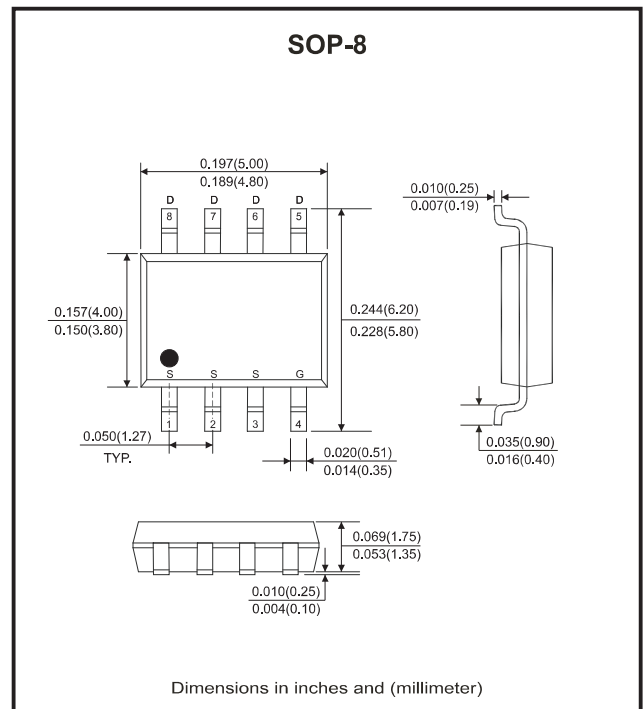
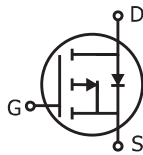
- $V_{DS} = -30V$, $I_D = -10A$
 $R_{DS(ON)} < 23m\Omega$ @ $V_{GS} = -10V$
 $R_{DS(ON)} < 34m\Omega$ @ $V_{GS} = -4.5V$
- Advanced Trench Technology
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- Lead free product is acquired

Application

- PWM Applications
- Load Switch
- Power Management

Circuit Diagram

- G : Gate
- S : Source
- D : Drain

Absolute Maximum Ratings ($T_A = 25^\circ C$ unless otherwise specified)

Symbol	Parameter		Max.	Units
V_{DSS}	Drain-Source Voltage		-30	V
V_{GSS}	Gate-Source Voltage		± 20	V
I_D	Continuous Drain Current	$T_C = 25^\circ C$	-10	A
		$T_C = 100^\circ C$	-7	A
I_{DM}	Pulsed Drain Current ^{note1}		-40	A
P_D	Power Dissipation	$T_A = 25^\circ C$	3.7	W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient		33.8	$^\circ C/W$
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	$^\circ C$

Electrical Characteristics ($T_J=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D = -250μA	-30	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -30V, V _{GS} = 0V,	-	-	-1	μA
I _{GSS}	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} = ±20V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = -250μA	-1.0	-1.5	-2.4	V
R _{DS(on)}	Static Drain-Source on-Resistance note2	V _{GS} =-10V, I _D =-10A	-	16	23	mΩ
		V _{GS} =-4.5V, I _D =-5A	-	21	34	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = -15V, V _{GS} = 0V, f = 1.0MHz	-	1550	-	pF
C _{oss}	Output Capacitance		-	327	-	pF
C _{rss}	Reverse Transfer Capacitance		-	278	-	pF
Q _g	Total Gate Charge	V _{DS} = -15V, I _D = -9.1A, V _{GS} = -10V	-	30	-	nC
Q _{gs}	Gate-Source Charge		-	5.3	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	7.6	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} = -15V, I _D = -6A, V _{GS} =-10V, R _{GEN} =2.5Ω	-	14	-	ns
t _r	Turn-on Rise Time		-	20	-	ns
t _{d(off)}	Turn-off Delay Time		-	95	-	ns
t _f	Turn-off Fall Time		-	65	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-10	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-40	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} = 0V, I _S = -10A	-	-0.8	-1.2	V

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$

Typical Performance Characteristics

Figure1: Output Characteristics

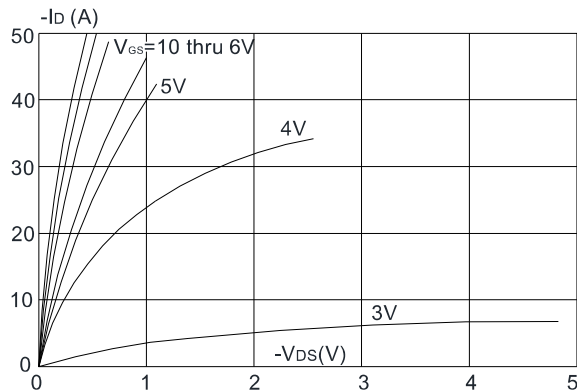


Figure 2: Typical Transfer Characteristics

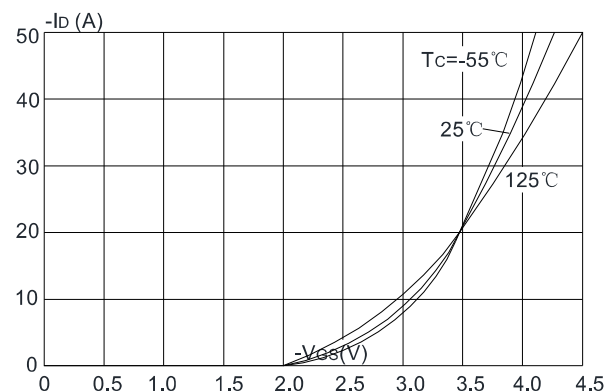


Figure 3: On-resistance vs. Drain Current

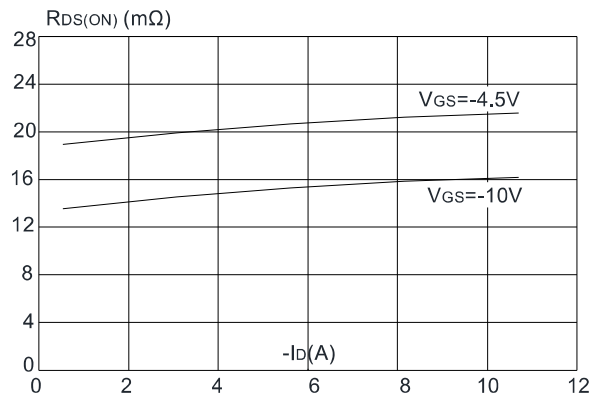


Figure 4: Body Diode Characteristics

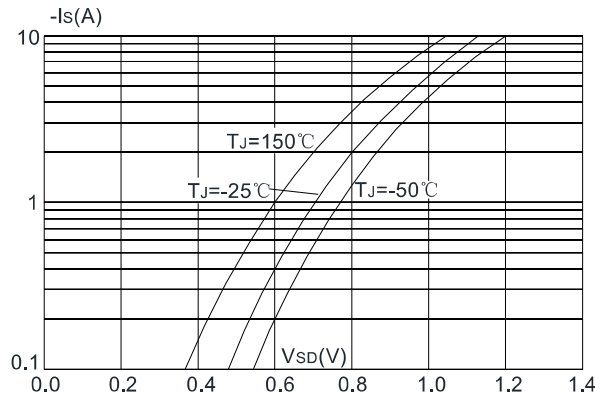


Figure 5: Gate Charge Characteristics

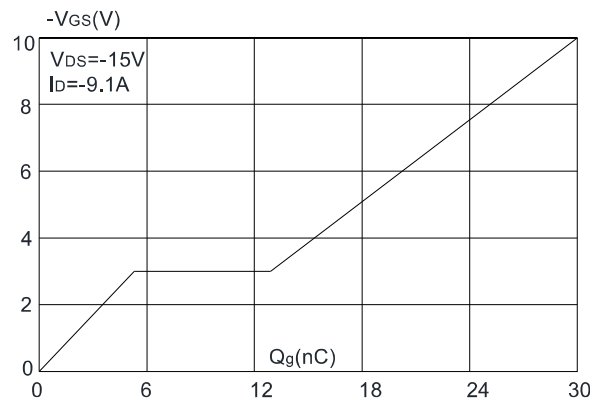


Figure 6: Capacitance Characteristics

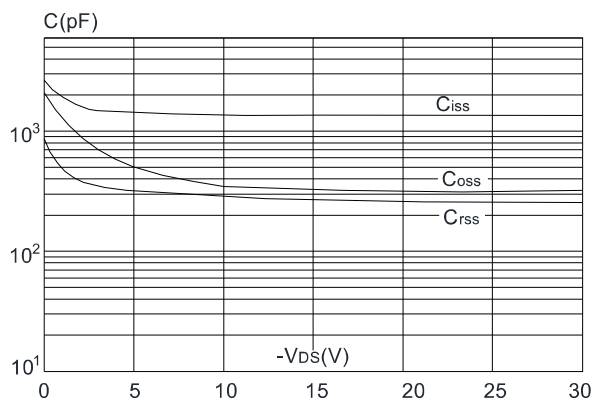


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

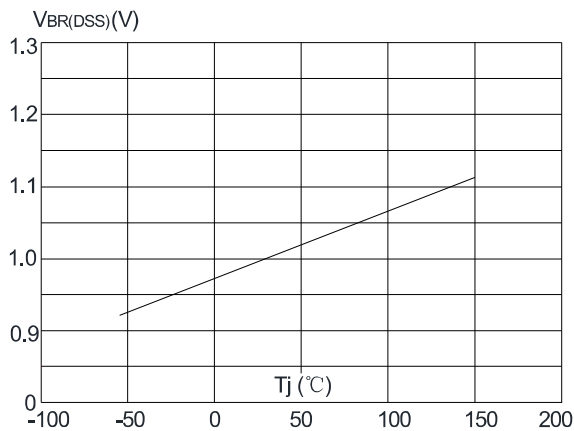


Figure 8: Normalized on Resistance vs. Junction Temperature

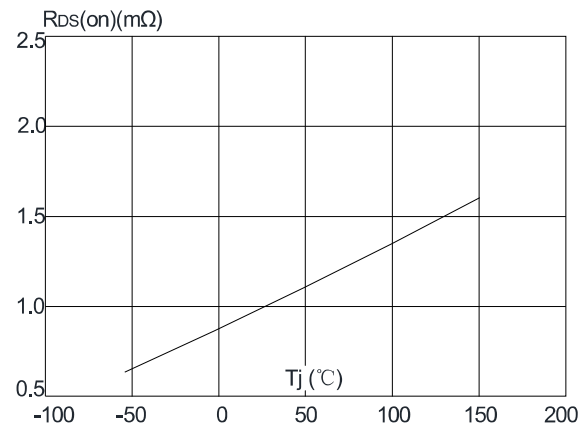


Figure 9: Maximum Safe Operating Area

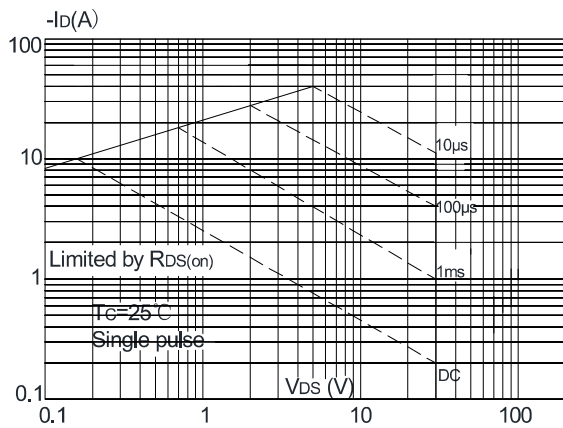


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

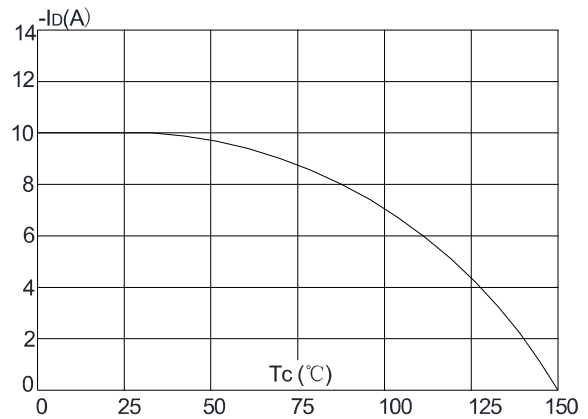
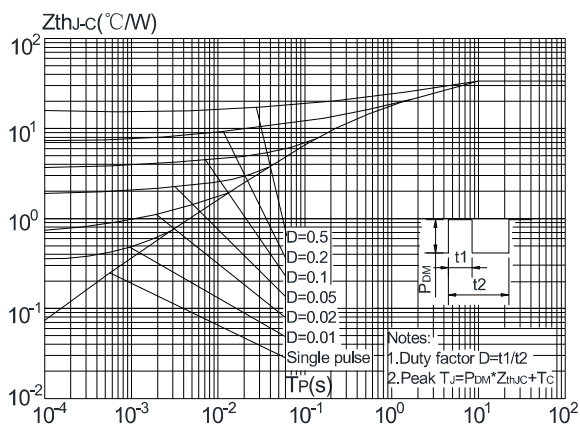
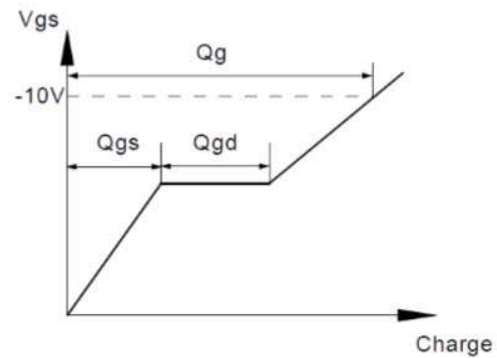
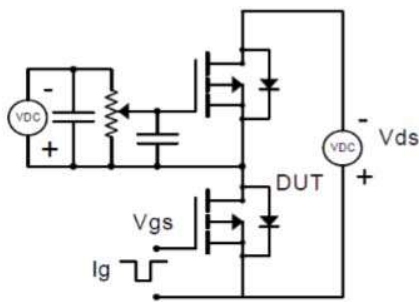


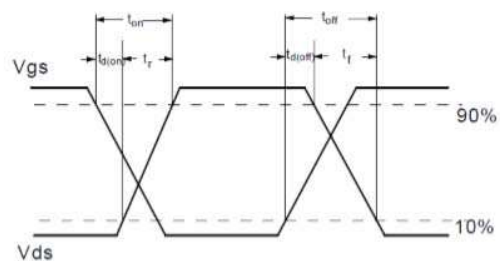
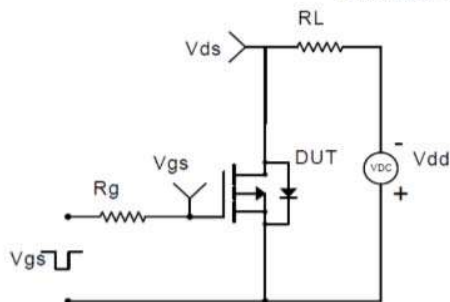
Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



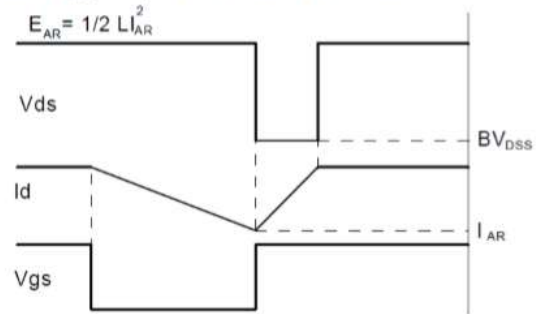
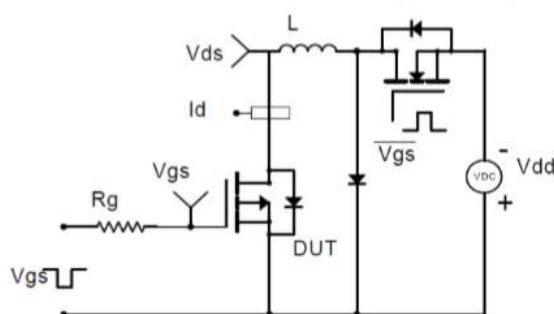
Gate Charge Test Circuit & Waveform



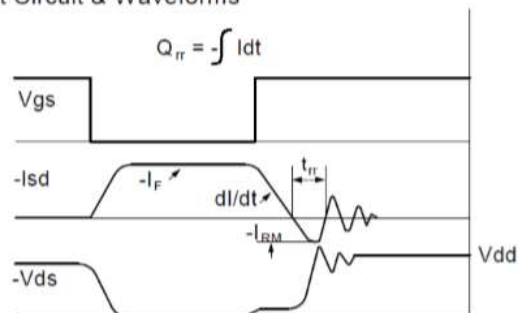
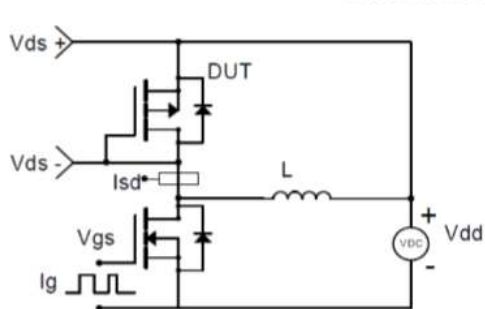
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

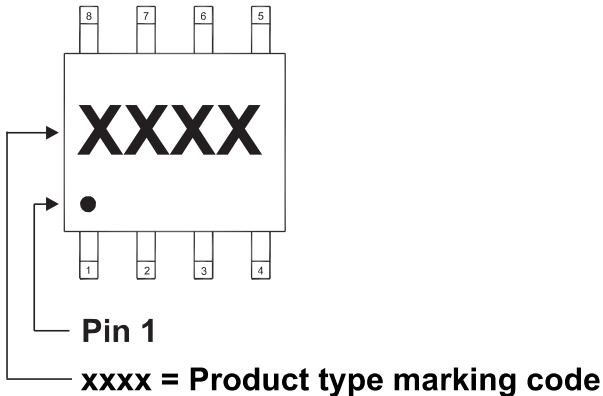


Diode Recovery Test Circuit & Waveforms



Marking Code

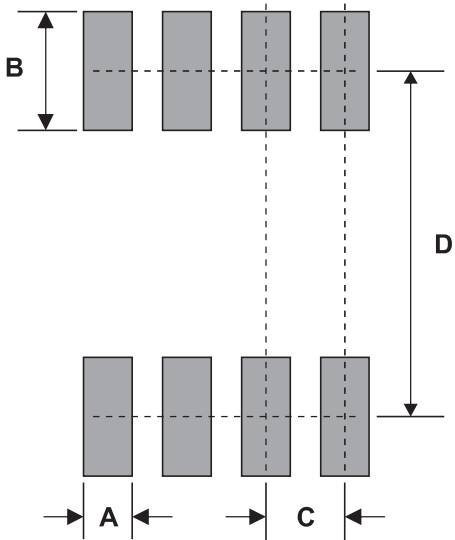
Part Number	Marking Code
LM4435A	4435



Suggested PAD Layout

SIZE	SOP-8	
	(mm)	(inch)
A	0.65	0.026
B	1.75	0.069
C	1.27	0.050
D	5.60	0.220

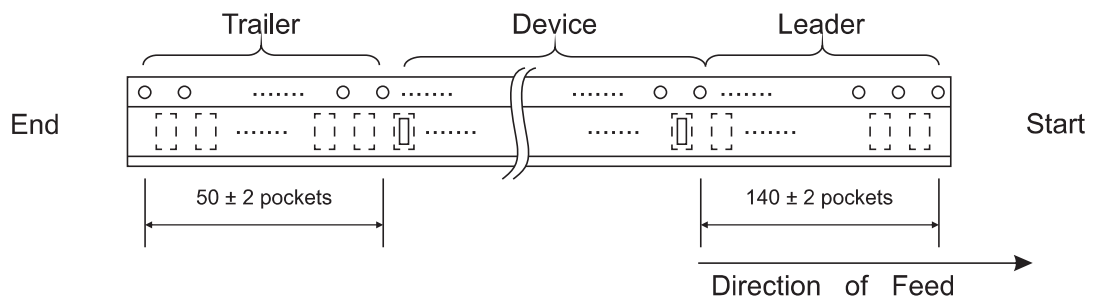
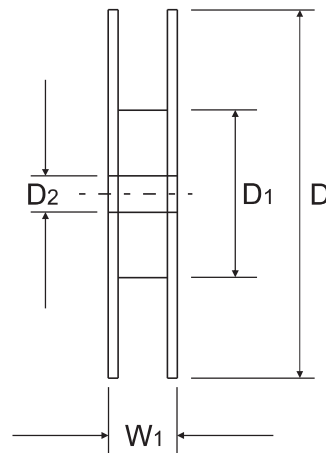
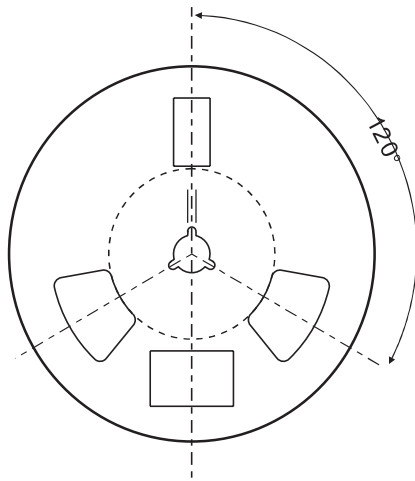
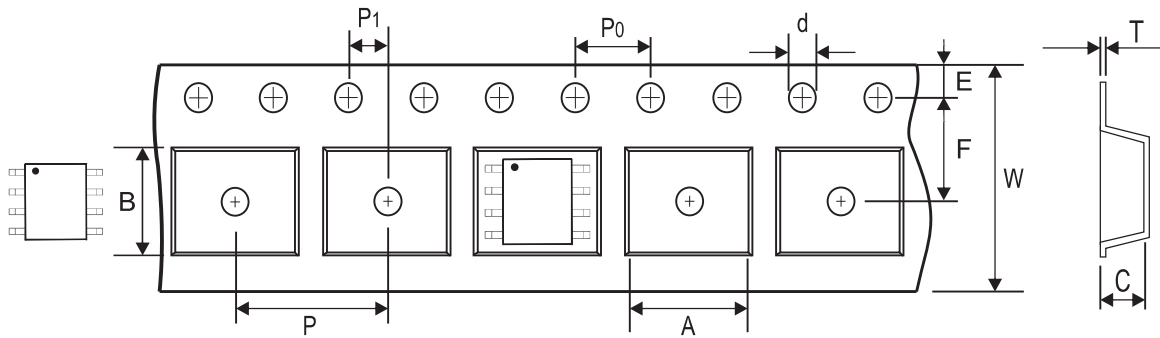
Note: 1. The pad layout is for reference purposes only.



Standard Packaging

Case Type	REEL PACK	
	REEL (pcs)	Reel Size (inch)
SOP-8	4000	13

Reel Taping Specification



SOP-8	SYMBOL	A	B	C	d	D	D1	D2
	(mm)	6.50 ± 0.10	5.30 ± 0.10	2.10 ± 0.10	$1.50^{+0.10}_{-0.00}$	330.00 ± 1.00	$178.00^{+0.00}_{-2.00}$	13.00 min.
	(inch)	0.256 ± 0.004	0.209 ± 0.004	0.083 ± 0.004	$0.059^{+0.004}_{-0.000}$	12.992 ± 0.039	$7.008^{+0.000}_{-0.079}$	0.512 min.

SOP-8	SYMBOL	E	F	P	P0	P1	T	W	W1
	(mm)	1.75 ± 0.10	5.50 ± 0.05	8.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	0.30 ± 0.05	12.00 ± 0.30	18.40 ref.
	(inch)	0.069 ± 0.004	0.217 ± 0.002	0.315 ± 0.004	0.157 ± 0.004	0.079 ± 0.002	0.012 ± 0.002	0.472 ± 0.012	0.724 ref.

Company reserves the right to improve product design , functions and reliability without notice.