

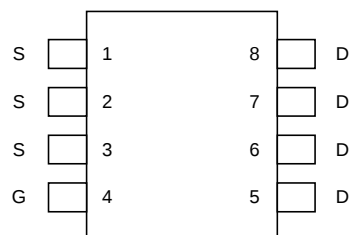


P-Channel Enhancement Mode MOSFET

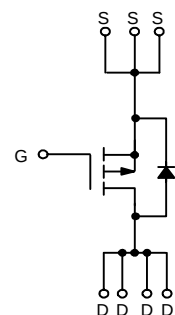
Features

- 30V/-8A, $R_{DS(ON)} = 16m\Omega(\text{typ.}) @ V_{GS} = -10V$
 $R_{DS(ON)} = 24m\Omega(\text{typ.}) @ V_{GS} = -4.5V$
- Super High Density Cell Design
- Reliable and Rugged
- SO-8 Package

Pin Description



SO-8



P-Channel MOSFET

Applications

- Power Management in Notebook Computer, Portable Equipment and Battery Powered Systems

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

Symbol	Parameter	Rating	Unit
V_{DSS}	Drain-Source Voltage	-30	V
V_{GSS}	Gate-Source Voltage	± 25	
I_D^*	Maximum Drain Current – Continuous $T_A = 25^\circ\text{C}$	-8	A
I_{DM}	Maximum Drain Current – Pulsed	-50	

*Surface Mounted on FR4 Board, $t \leq 10$ sec.

TF reserves the right to make changes to improve reliability or manufacturability without notice, and advise customers to obtain the latest version of relevant information to verify before placing orders.

**Absolute Maximum Ratings (Cont.)** ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Rating	Unit
P_D	Maximum Power Dissipation	$T_A = 25^\circ\text{C}$	2.5
		$T_A = 100^\circ\text{C}$	1
T_J	Maximum Junction Temperature	150	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-55 to 150	
$R_{\theta JA}$	Thermal Resistance - Junction to Ambient	50	$^\circ\text{C/W}$

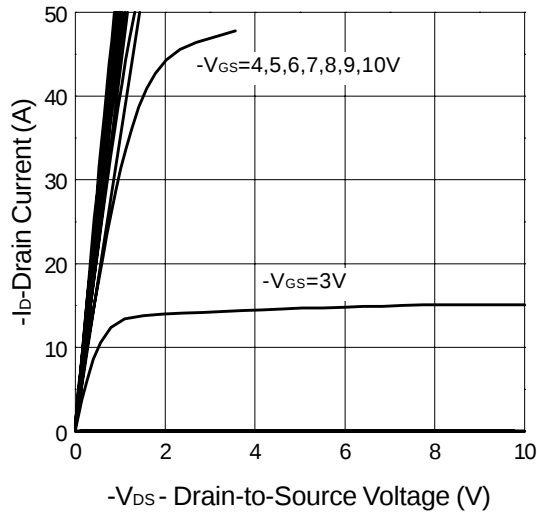
Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Condition	APM4835			Unit
			Min.	Typ ^a .	Max.	
Static						
BV _{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
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D = -250μA	-1	-1.5	-2	V
I _{GSS}	Gate Leakage Current	V _{GS} = ±25V , V _{DS} =0V			±100	nA
R _{DS(ON)}	Drain-Source On-state Resistance ^b	V _{GS} = -10V, I _D = -8A		16	19	mΩ
		V _{GS} = -4.5V, I _D = -5A		24	30	
V _{SD}	Diode Forward Voltage ^b	I _{SD} = -3A, V _{GS} =0V		-0.7	-1.3	V
Dynamic ^a						
Q _g	Total Gate Charge	V _{DS} = -15V, V _{GS} = -10V, I _D = -4.6A		48	60	nC
Q _{gs}	Gate-Source Charge			10		
Q _{gd}	Gate-Drain Charge			9		
t _{d(ON)}	Turn-on Delay Time	V _{DD} = -25V, I _D = -2A, V _{GEN} = -10V, R _G =6Ω R _L =12.5Ω		16	30	ns
t _r	Turn-on Rise Time			17	30	
t _{d(OFF)}	Turn-off Delay Time			75	120	
t _f	Turn-off Fall Time			31	80	
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-25V Frequency = 1.0MHZ		3800		pF
C _{oss}	Output Capacitance			590		
C _{rss}	Reverse Transfer Capacitance			250		

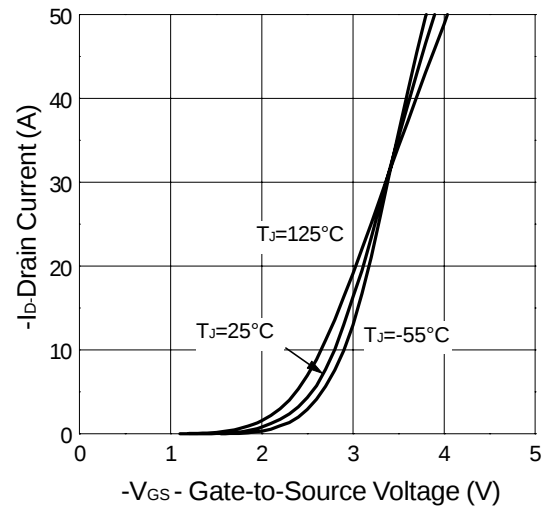
Notes^a : Guaranteed by design, not subject to production testing^b : Pulse test ; pulse width $\leq 500\mu s$, duty cycle $\leq 2\%$

Typical Characteristics

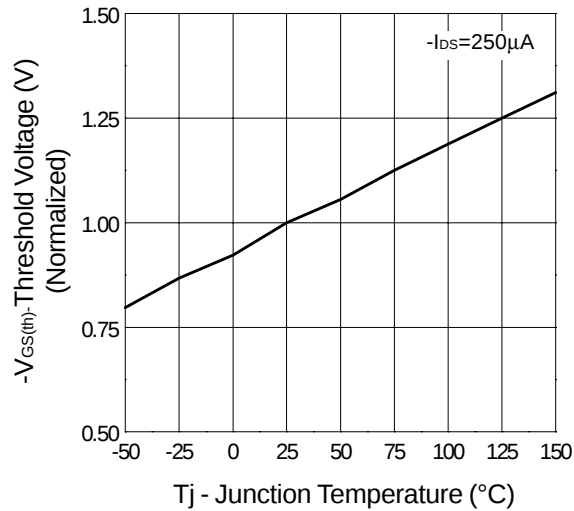
Output Characteristics



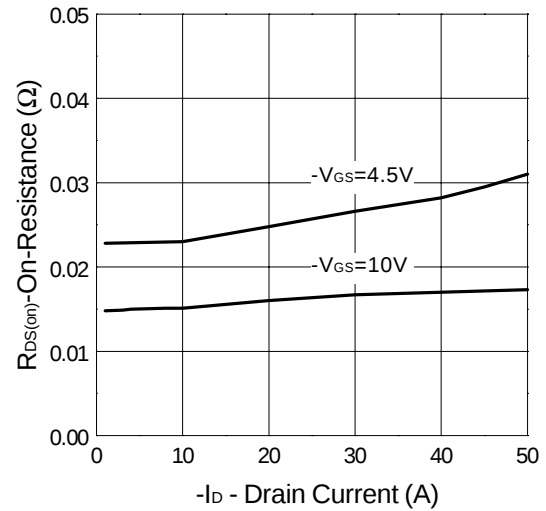
Transfer Characteristics



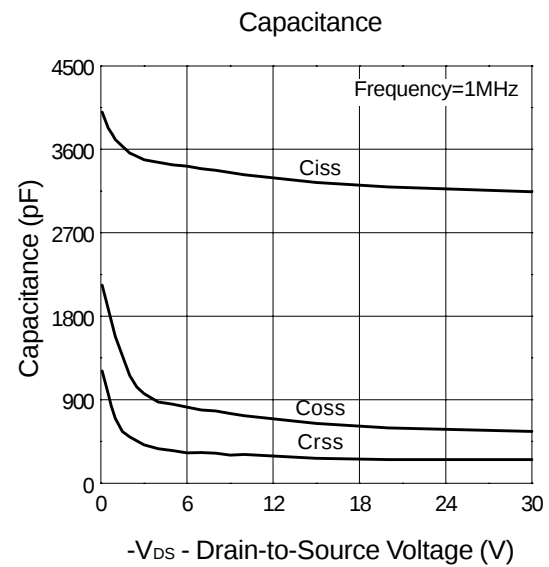
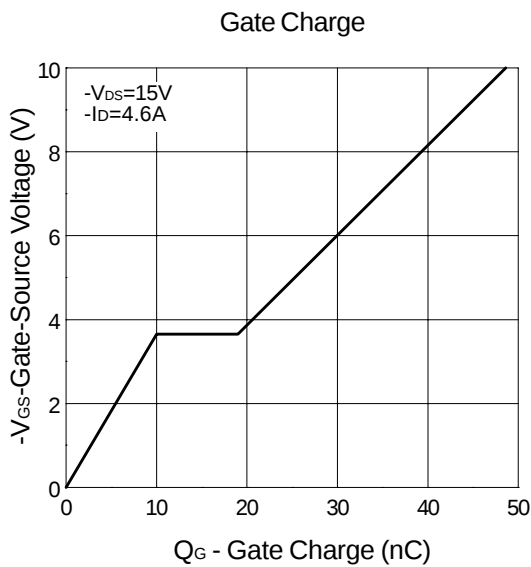
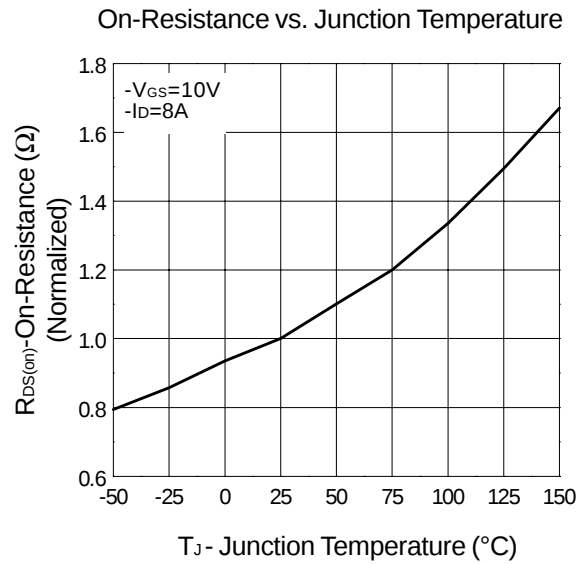
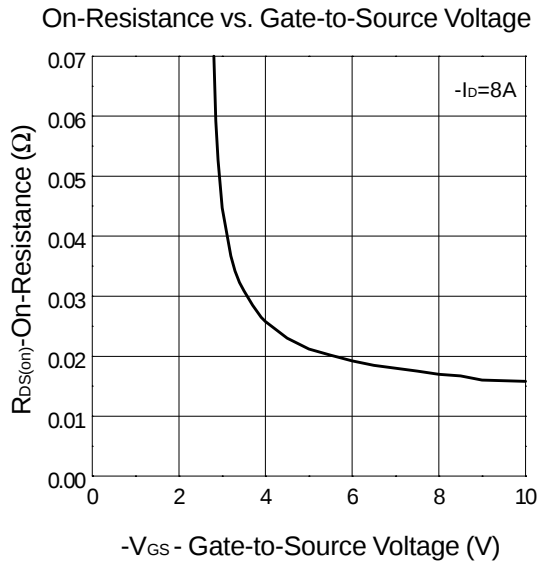
Threshold Voltage vs. Junction Temperature



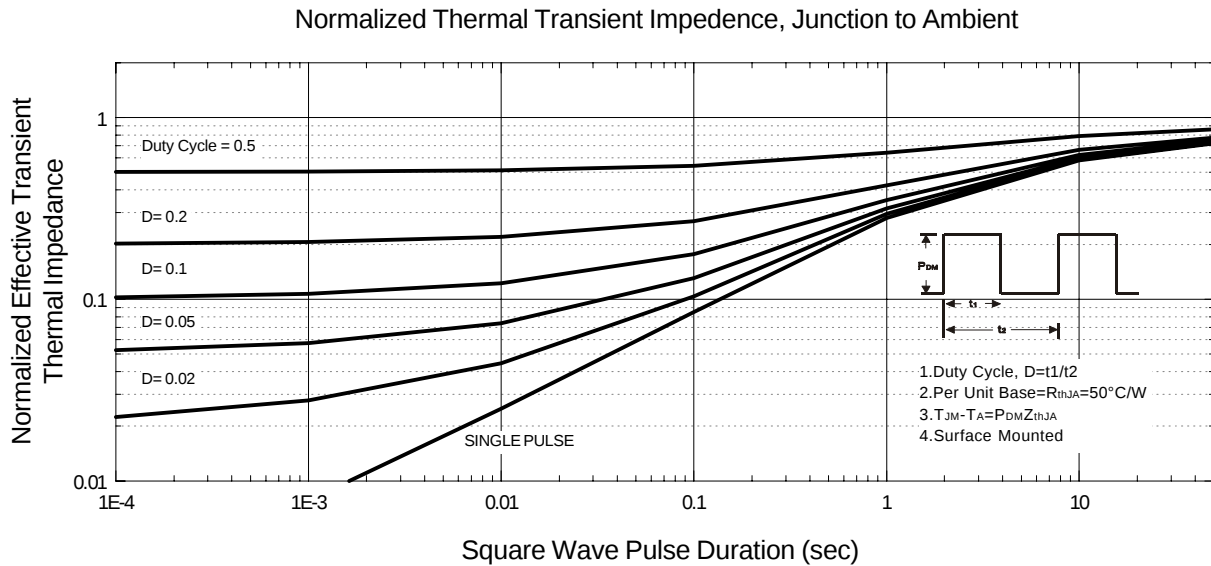
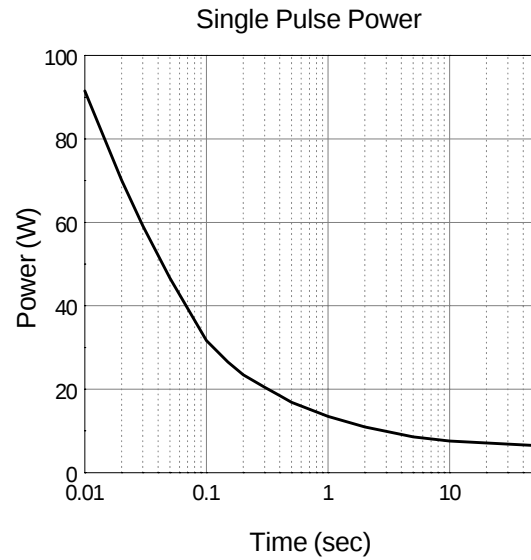
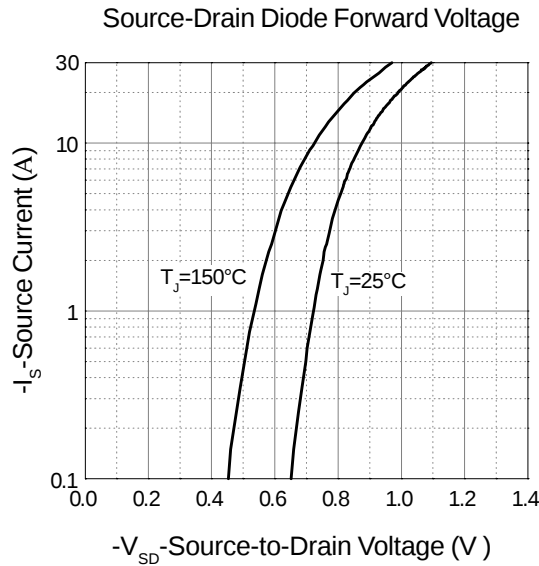
On-Resistance vs. Drain Current



Typical Characteristics (Cont.)

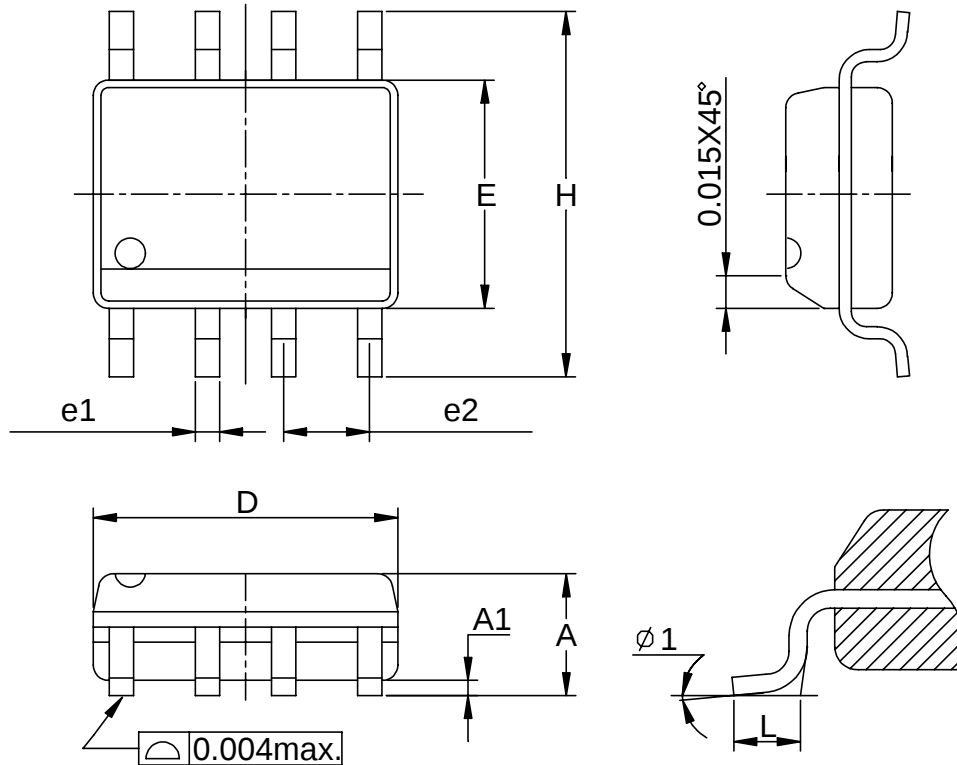


Typical Characteristics (Cont.)



Packaging Information

SOP-8 pin (Reference JEDEC Registration MS-012)



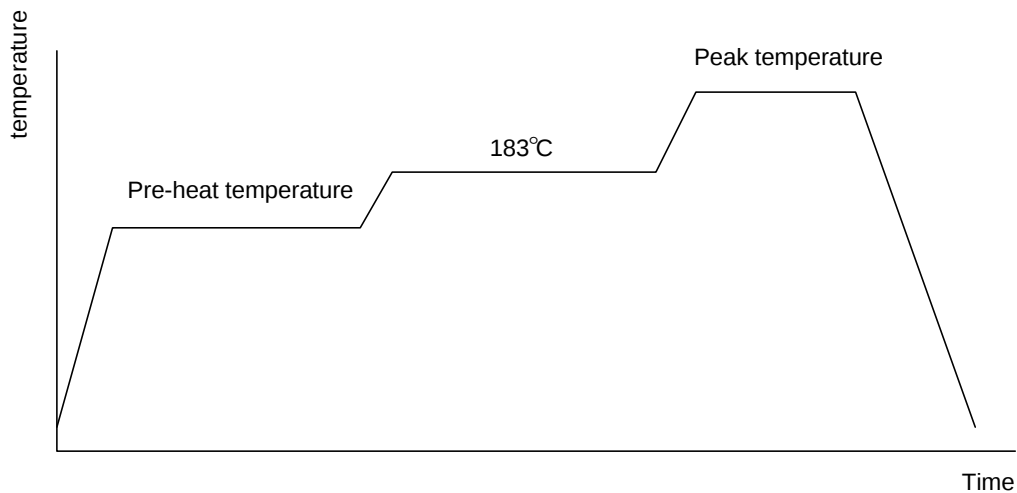
Dim	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
D	4.80	5.00	0.189	0.197
E	3.80	4.00	0.150	0.157
H	5.80	6.20	0.228	0.244
L	0.40	1.27	0.016	0.050
e1	0.33	0.51	0.013	0.020
e2	1.27BSC		0.50BSC	
$\phi 1$	8°		8°	



Physical Specifications

Terminal Material	Solder-Plated Copper (Solder Material : 90/10 or 63/37 SnPb)
Lead Solderability	Meets EIA Specification RSI86-91, ANSI/J-STD-002 Category 3.

Reflow Condition (IR/Convection or VPR Reflow)



Classification Reflow Profiles

	Convection or IR/ Convection	VPR
Average ramp-up rate(183°C to Peak)	3°C/second max.	10 °C /second max.
Preheat temperature 125 ± 25°C)	120 seconds max	
Temperature maintained above 183°C	60 – 150 seconds	
Time within 5°C of actual peak temperature	10 – 20 seconds	60 seconds
Peak temperature range	220 +5/-0°C or 235 +5/-0°C	215-219°C or 235 +5/-0°C
Ramp-down rate	6 °C /second max.	10 °C /second max.
Time 25°C to peak temperature	6 minutes max.	

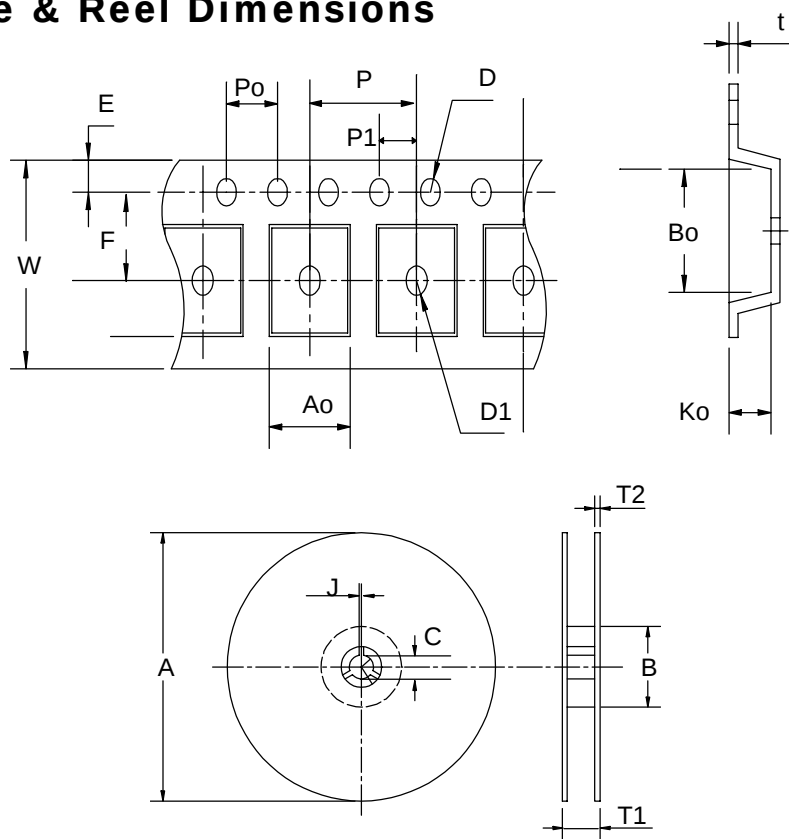
Package Reflow Conditions

pkg. thickness ≥ 2.5mm and all bgas	pkg. thickness < 2.5mm and pkg. volume ≥ 350 mm ³	pkg. thickness < 2.5mm and pkg. volume < 350mm ³
Convection 220 +5/-0 °C		Convection 235 +5/-0 °C
VPR 215-219 °C		VPR 235 +5/-0 °C
IR/Convection 220 +5/-0 °C		IR/Convection 235 +5/-0 °C

Reliability test program

Test item	Method	Description
SOLDERABILITY	MIL-STD-883D-2003	245°C, 5 SEC
HOLT	MIL-STD 883D-1005.7	1000 Hrs Bias @ 125°C
PCT	JESD-22-B, A102	168 Hrs, 100% RH, 121°C
TST	MIL-STD 883D-1011.9	-65°C ~ 150°C, 200 Cycles

Carrier Tape & Reel Dimensions



Application	A	B	C	J	T1	T2	W	P	E
SOP- 8	330 ± 1	62 ± 1.5	12.75 ⁺ _{0.15}	2 ± 0.5	12.4 ± 0.2	2 ± 0.2	12 ± 0.3	8 ± 0.1	1.75 ± 0.1
	F	D	D1	P0	P1	A0	Bo	Ko	t
	5.5 ± 1	1.55 ± 0.1	1.55 ± 0.25	4.0 ± 0.1	2.0 ± 0.1	6.4 ± 0.1	5.2 ± 0.1	2.1 ± 0.1	0.3 ± 0.013