CEU02N65G

650V ▲ 4.4Ω ▲ 1.8A ▲ Si MOSFET

SILICON Si MOSFET ▲ SMD type
N-channel enhancement mode
UL94V-0 rated flame retardant epoxy
TO252 (DPAK) package ▲ MSL 3
Super high dense cell density for extremely low $R_{DS(ON)}$
High power and current handling capability

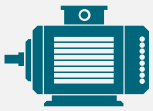
MAXIMUM RATINGS

Parameter (T_C = 25°C, unless otherwise noted)		Characteristics
Drain-Source Voltage	V_{DS}	650V
Gate-Source Voltage	V_{GS}	±30V
Continuous Drain Current at T_C = 25°C	I_D	1.8A
Continuous Drain Current at T_C = 100°C	I_D	1.1A
Pulsed Drain Current Note 1	I_{DM}	7.2A
Maximum Power Dissipation at T_C = 25°C	P_D	48W
Power Dissipation Derating above 25°C	ΔP_D	0.38W/°C
Single Pulsed Avalanche Energy Note 5	E_{AS}	11.25mJ
Single Pulsed Avalanche Current Note 5	I_{AS}	1.5A
Operating and Storage Temperature Range	T_J, T_{STG}	-55°C to +150°C

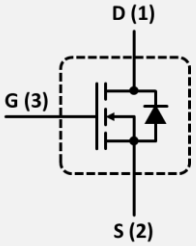
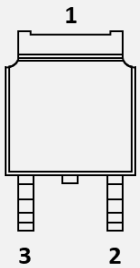
THERMAL CHARACTERISTICS

Parameter	Symbol	Limit
Thermal Resistance, Junction-to-Case	R_{TH_JC}	2.6°C/W
Thermal Resistance, Junction-to-Ambient	R_{TH_JA}	50°C/W

APPLICATIONS

EV Charging	Industrial Inverters	Motors & Drives	Power Factor Correction	Renewable Energy	SMPS	UPS
						

PIN DESCRIPTION

Circuit Diagram	Outline ▪ Bottom View	Pin No.	Description
		1 2 3	Drain Source Gate

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ELECTRICAL CHARACTERISTICS ▲ T_C = 25°C, unless otherwise noted

Item	Condition	Symbol	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250μA	BV_{DSS}	650			V
Zero Gate Voltage Drain Current	V_{DS} = 650V, V_{GS} = 0V	I_{DSS}			1	μA
Gate Body Leakage Current, Forward	V_{GS} = 30V, V_{DS} = 0V	I_{GSSF}			100	nA
Gate Body Leakage Current, Reverse	V_{GS} = -30V, V_{DS} = 0V	I_{GSSR}			-100	nA
On Characteristics Note 2						
Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 250μA	$V_{GS(th)}$	2		4	V
Static Drain-Source On-Resistance	V_{GS} = 10V, I_D = 2A	$R_{DS(ON)}$		4.4	5.5	Ω
Dynamic Characteristics Note 3						
Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1MHz	C_{ISS}		295		pF
Output Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1MHz	C_{OSS}		75		pF
Reverse Transfer Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1MHz	C_{RSS}		20		pF
Switching Characteristics Note 3						
Turn-On Delay Time	V_{DD} = 300V, V_{GS} = 10V, I_D = 1A, $R_{G(ext)}$ = 18Ω	$t_{D(ON)}$		19	38	ns
Turn-On Rise Time	V_{DD} = 300V, V_{GS} = 10V, I_D = 1A, $R_{G(ext)}$ = 18Ω	t_R		11	22	ns
Turn-Off Delay Time	V_{DD} = 300V, V_{GS} = 10V, I_D = 1A, $R_{G(ext)}$ = 18Ω	$t_{D(OFF)}$		29	58	ns
Turn-Off Fall Time	V_{DD} = 300V, V_{GS} = 10V, I_D = 1A, $R_{G(ext)}$ = 18Ω	t_F		10	20	ns
Total Gate Charge	V_{DD} = 480V, V_{GS} = 10V, I_D = 1A	Q_G		6.7	8.9	nC
Gate Source Charge	V_{DD} = 480V, V_{GS} = 10V, I_D = 1A	Q_{GS}		1.5		nC
Gate Drain Charge	V_{DD} = 480V, V_{GS} = 10V, I_D = 1A	Q_{GD}		3		nC
Drain-Source Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Current		I_S			1.8	A
Drain-Source Diode Forward Voltage Note 2	V_{GS} = 0V, I_S = 1A	V_{SD}			1.5	V

Notes

1: Repetitive Rating: Pulse width limited by maximum junction temperature.

2: Device Mounted on FR4 Board, t ≤ 10 sec.

3: Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.

4: Guaranteed by design, not subject to production testing.

5: L = 10mH, I_{AS} = 1.5A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C.

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REFERENCE DATA ▲ TYPICAL DEVICE PERFORMANCE

Fig. 1 ▪ Output Characteristics

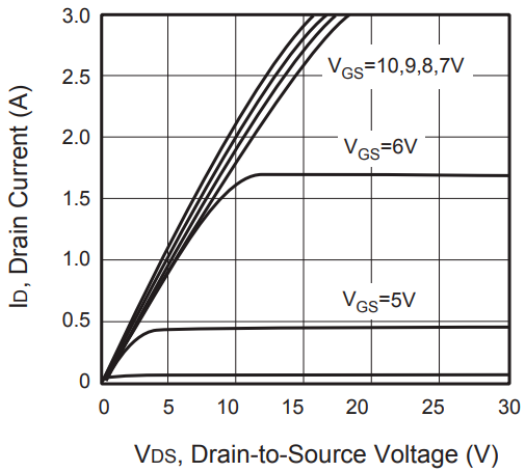


Fig. 2 ▪ Transfer Characteristics

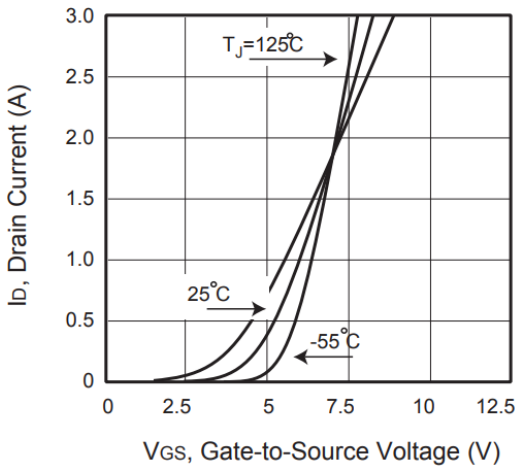


Fig. 3 ▪ Capacitance

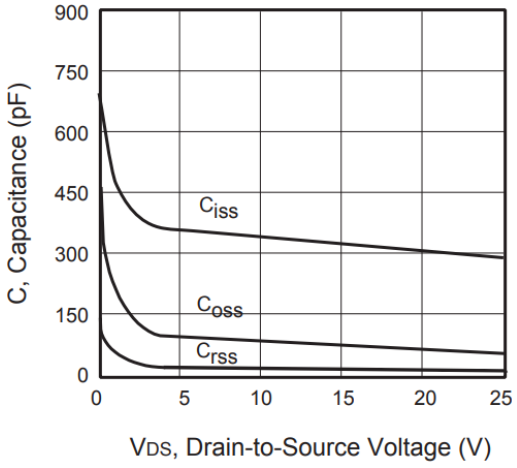


Fig. 4 ▪ On-Resistance Variation with Temperature

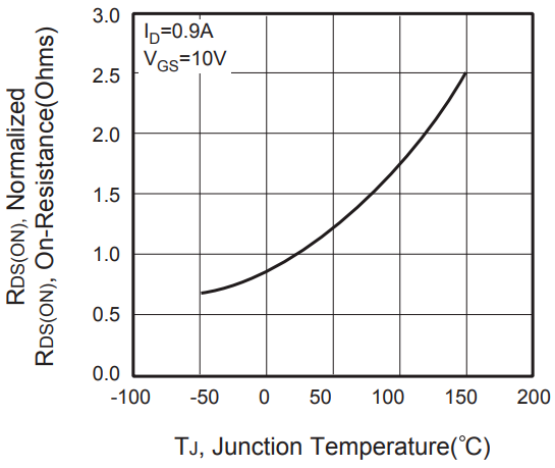


Fig. 5 ▪ Gate Threshold Variation with Temperature

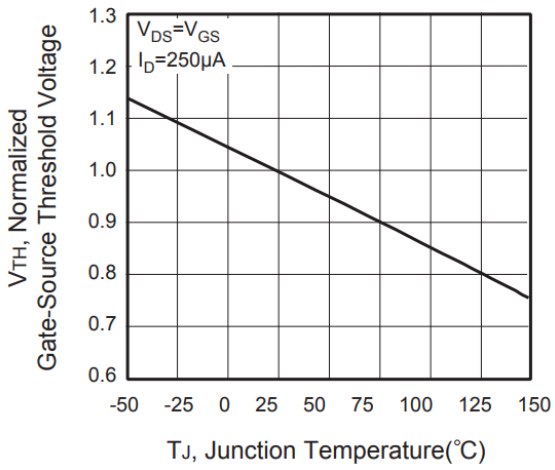
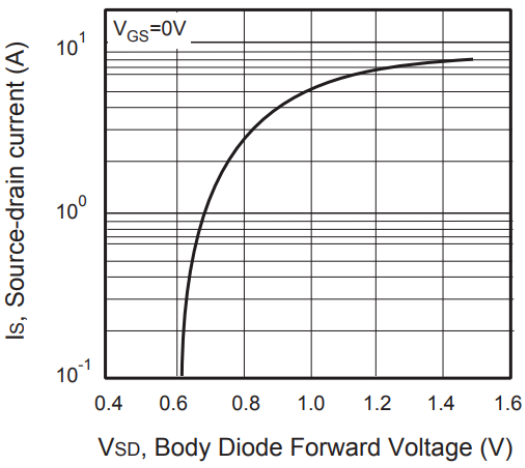


Fig. 6 ▪ Body Diode Forward Voltage Variation with Source Current



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REFERENCE DATA ▲ TYPICAL DEVICE PERFORMANCE

Fig. 7 ▪ Gate Charge

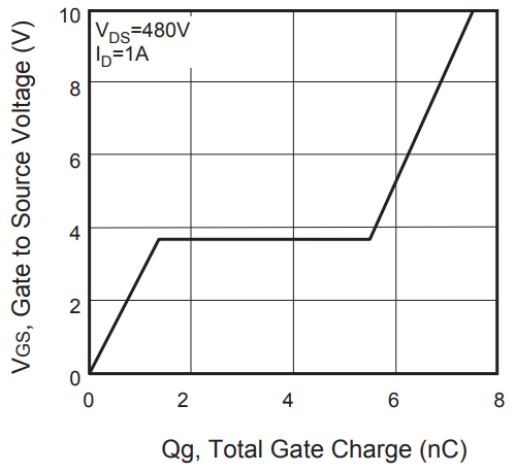


Fig. 8 ▪ Maximum Safe Operating Area

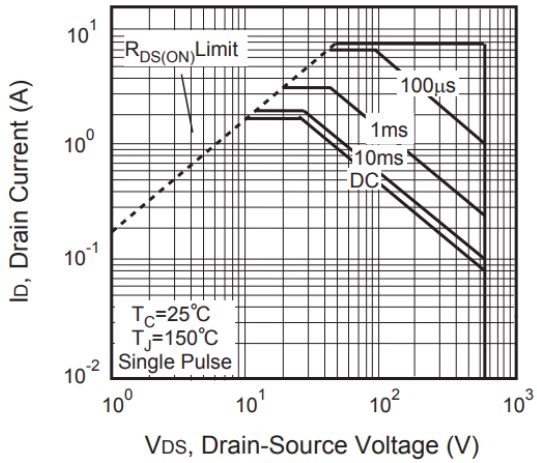


Fig. 9 ▪ Switching Test Circuit

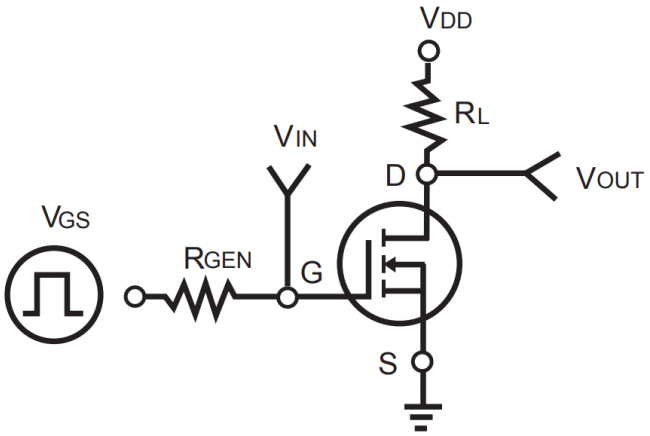


Fig. 10 ▪ Switching Waveforms

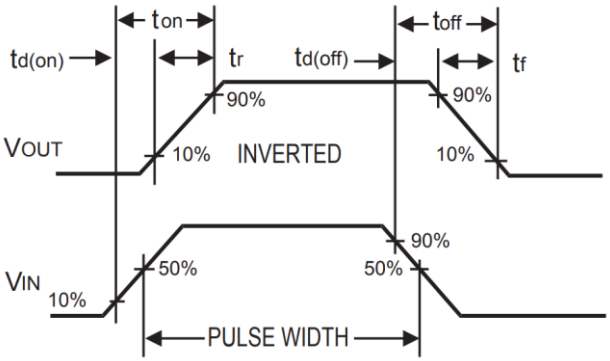
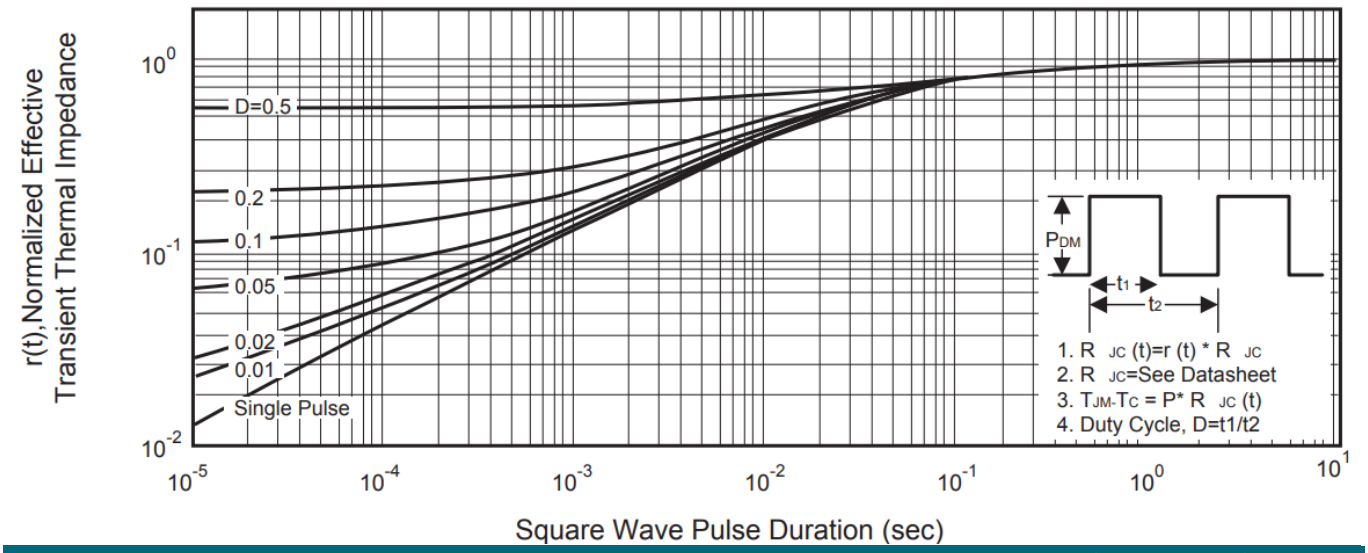


Fig. 11 ▪ Normalized Thermal Transient Impedance Curve



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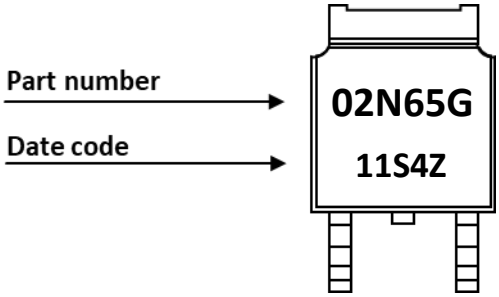
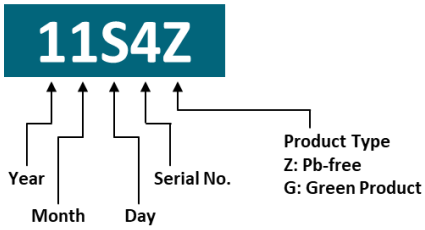
PART MARKING



DATE CODE

Example: 11S4Z



Coding list for „Day“

1	2	3	4	5	6	7	8	9	A
01	02	03	04	05	06	07	08	09	10
B	C	D	E	F	G	H	I	J	K
11	12	13	14	15	16	17	18	19	20
L	M	N	O	P	Q	R	S	T	U
21	22	23	24	25	26	27	28	29	30
V									
31									

Coding list for „Month“

1	2	3	4	5	6
Jan	Feb	Mar	Apr	May	Jun
7	8	9	A	B	C
Jul	Aug	Sep	Oct	Nov	Dec

Coding list for „Year“

0	1	2	3	4
2020	2021	2022	2023	2024
5	6	7	8	9
2025	2026	2027	2028	2029

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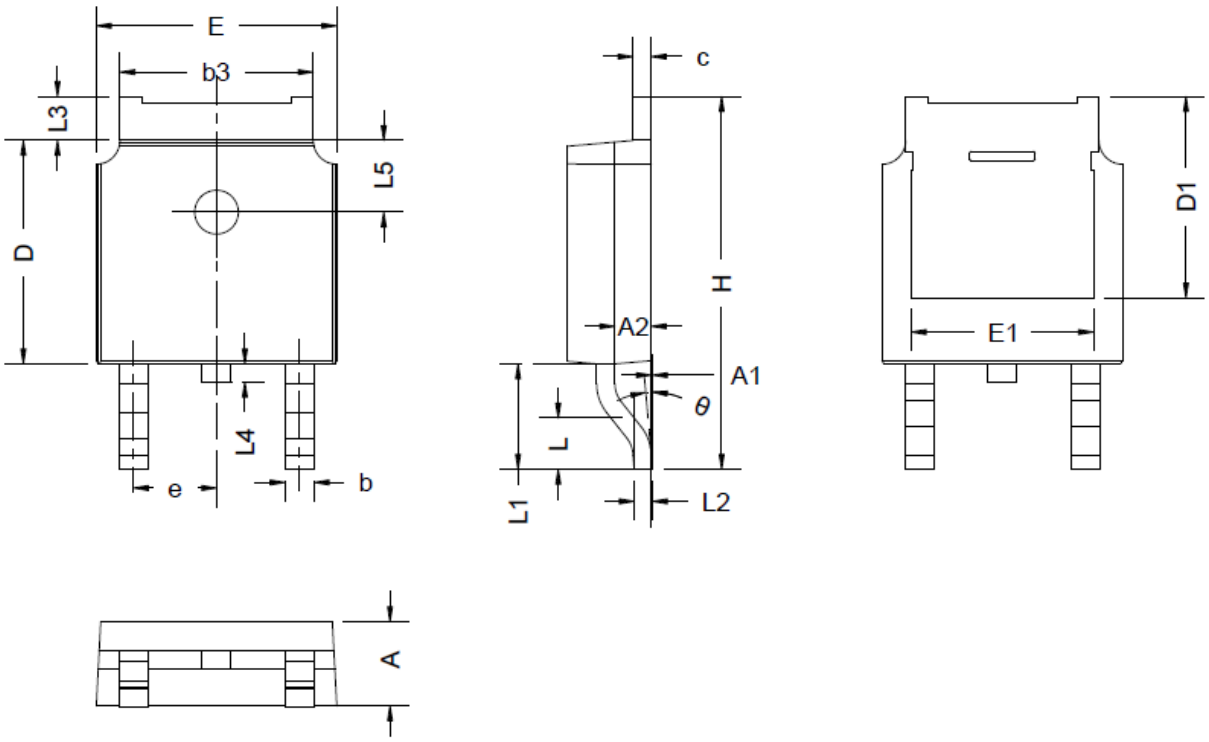
PACKAGE OUTLINE



Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
A	2.20	2.30	2.38
A1	0.00	-	0.20
A2	0.90	1.07	1.17
b	0.68	0.78	0.90
b3	5.23	5.33	5.46
c	0.43	0.53	0.61
D	5.98	6.10	6.22
D1		5.30 REF	
E	6.40	6.60	6.73
E1	4.63	-	-

Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
e		2.286 BSC	
H	9.40	10.10	10.50
L	1.38	1.50	1.75
L1		2.90 REF	
L2		0.51 BSC	
L3	0.88	-	1.28
L4	0.50	.	1.00
L5	1.65	1.80	1.95
θ	0°	-	8°

ORDERING INFORMATION

Part Number	Package	Packing	Reel Qty.	Inner Box Qty.	Outer Box Qty.
CEU02N65G	TO252 (DPAK)	Reel	2,500pcs	5,000pcs	40,000pcs

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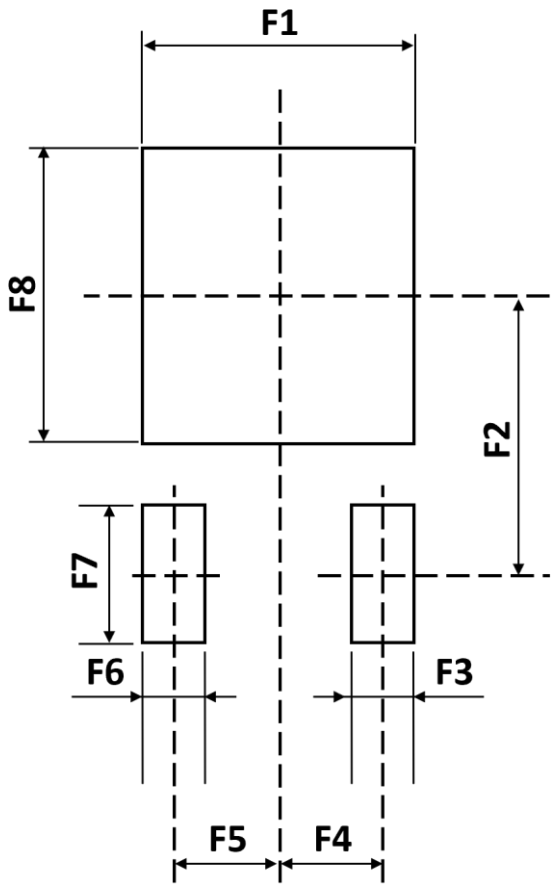
RECOMMENDED PAD LAYOUT



Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
F1	-	6.00	-
F2	-	6.25	-
F3	-	1.40	-
F4	-	2.29	-

Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
F5	-	2.29	-
F6	-	1.40	-
F7	-	3.00	-
F8	-	6.50	-

Notes:

1. The suggested land pattern dimensions have been provided for reference only.

2. For further information, please reference document IPC-7351A.

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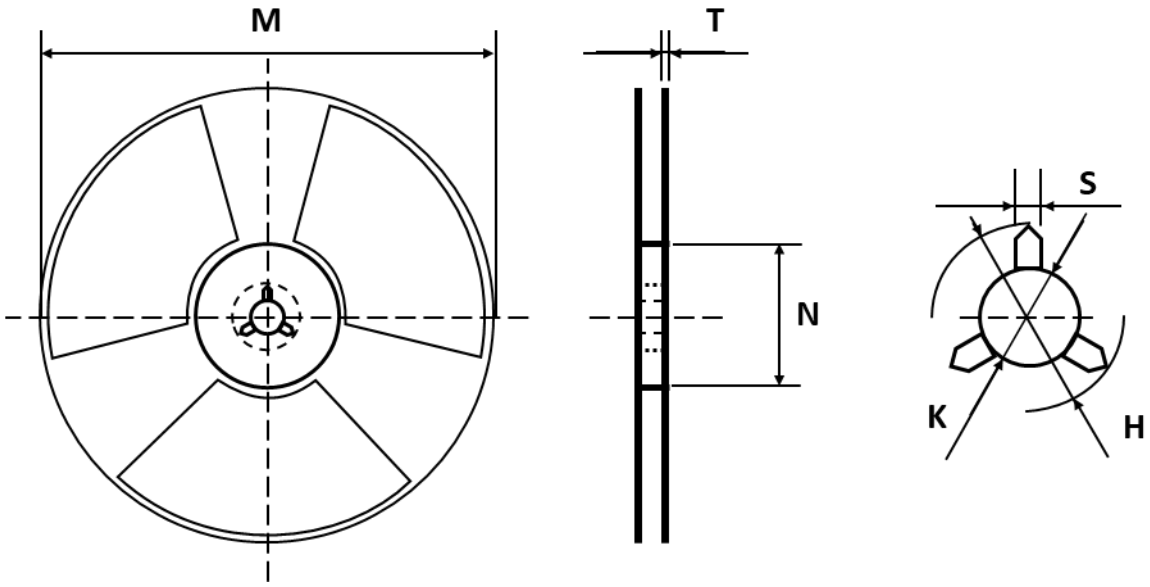
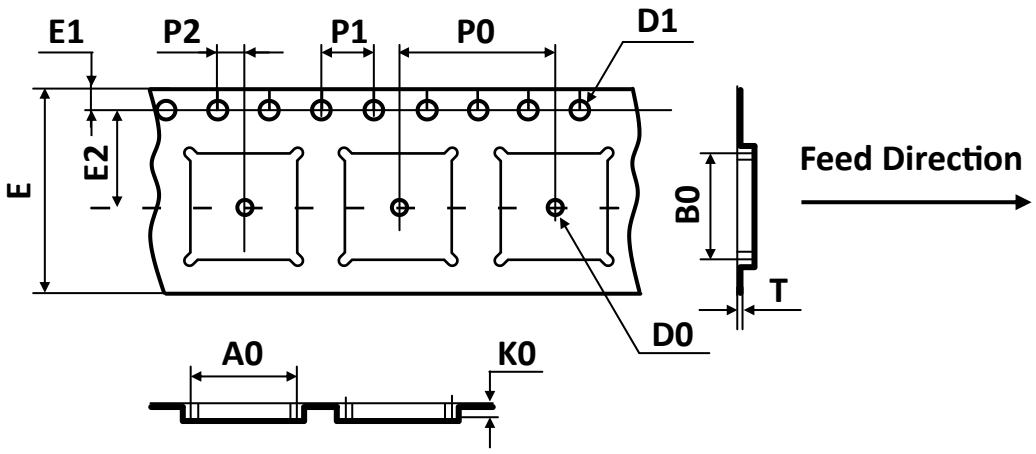
REEL DIMENSIONS ▲ All dimensions in mm



Tape Size	Reel Size	M	N	T	H	K	S
16mm	Ø330	Ø330.00	Ø100.00	2.10	22.00	13.00	2.00
		±2.00	±0.50	±0.20	±0.50	+0.50 -0.20	+0.50 -0.20

TAPE DIMENSIONS ▲ All dimensions in mm



Package	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
TO252 (DPAK)	6.90	10.50	2.70	1.50	1.50	16.00	1.75	7.50	8.00	4.00	2.00	0.30
	±0.10	±0.10	±0.10	MIN	±0.10	+0.30 -0.20	±0.10	±0.10	±0.10	±0.10	±0.10	±0.05

Note: **All dimensions meet EIA-481-D requirements.**

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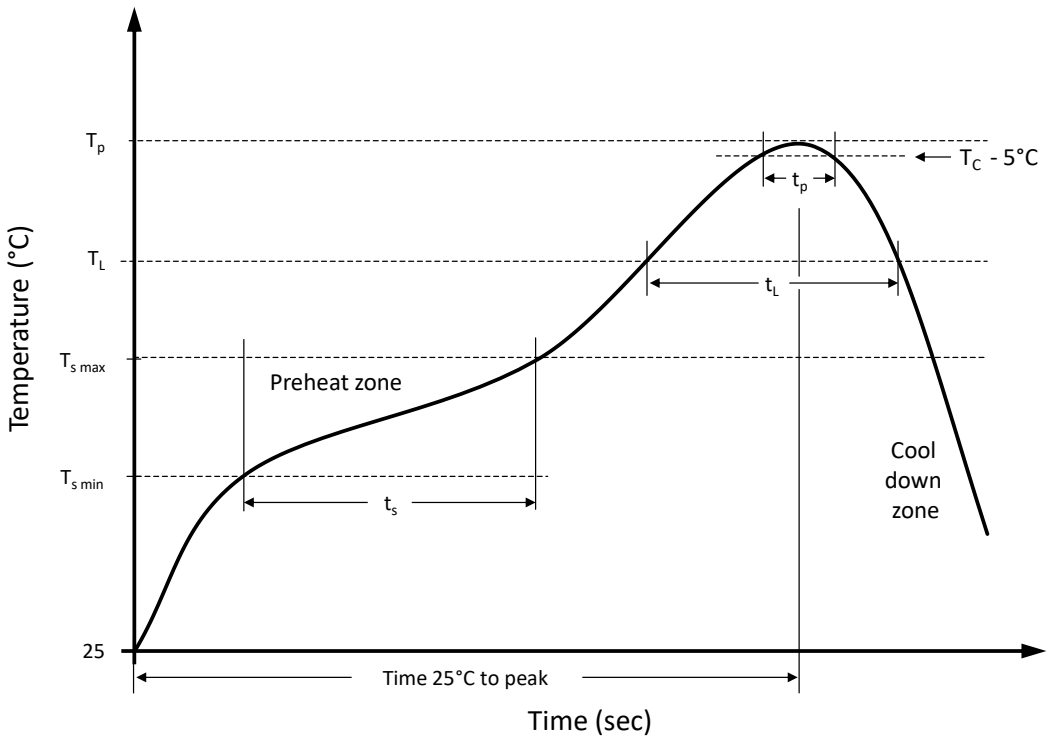
RECOMMENDED REFLOW SOLDERING PROFILE



Recommended reflow soldering conditions ▲ Refer to JEDEC J-STD-020E

Profile Features		Sn-Pb Eutetic Assembly	Pb-Free Assembly
Preheat temperature min.	$T_{s\,min}$	100 °C	150 °C
Preheat temperature max.	$T_{s\,max}$	150 °C	200 °C
Preheat time t_s from $T_{s\,min}$ to $T_{s\,max}$	t_s	120 seconds	120 seconds
Ramp-up rate (T_L to T_p)		max. 3 °C/second	max. 3 °C/second
Liquidous temperature	T_L	183 °C	217 °C
Time t_L maintained above T_L	t_L	150 seconds max.	150 seconds max.
Peak package body temperature	T_p	235°C	260°C
Timeframe of within 5°C below and up to max actual peak body temperature	t_p	20 seconds max.	30 seconds max.
Ramp-down rate (T_L to T_p)		max. 6 °C/second	max. 6 °C/second
Time 25°C to peak temperature		max. 6 minutes	max. 8 minutes

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REVISION TABLE

Revision	Date	Status	Notes
001	30/09/2022	Initial release	Initial publication

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