MGT★

CEB85N75

75V ▲ 10mΩ ▲ 86A ▲ Si MOSFET

SILICON Si MOSFET ▲ SMD type
N-channel enhancement mode
UL94V-0 rated flame retardant epoxy
TO263 (D2PAK) package ▲ MSL 3
Super high dense cell density for extremely low $R_{DS(ON)}$
High power and current handling capability

RoHS compliant

REACH COMPLIANT

HALOGEN FREE

MAXIMUM RATINGS

Parameter (T_C = 25°C, unless otherwise noted)		Characteristics
Drain-Source Voltage	V_{DS}	75V
Gate-Source Voltage	V_{GS}	±30V
Continuous Drain Current at T_C = 25°C	I_D	86A
Pulsed Drain Current [Note 1]	I_{DM} [Note 5]	344A
Maximum Power Dissipation at T_C = 25°C	P_D	200W
Power Dissipation Derating above 25°C	ΔP_D	1.33W/°C
Single Pulsed Avalanche Energy [Note 4]	E_{AS}	880mJ
Single Pulsed Avalanche Current [Note 4]	I_{AS}	45A
Operating and Storage Temperature Range	T_J, T_{STG}	-55°C to +175°C
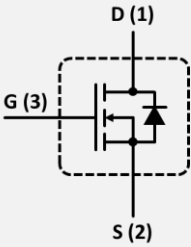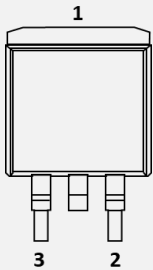
THERMAL CHARACTERISTICS

Parameter	Symbol	Limit
Thermal Resistance, Junction-to-Case	R_{TH_JC}	0.75°C/W
Thermal Resistance, Junction-to-Ambient	R_{TH_JA}	62.5°C/W

APPLICATIONS

Audio Amplifier	Battery Management Systems	Industrial Control	Power Inverter	UPS

PIN DESCRIPTION

Circuit Diagram	Outline ▪ Bottom View	Pin No.	Description
D (1) G (3) S (2)	1 3 2	1 2 3	Drain Source Gate

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}	75			V
Zero Gate Voltage Drain Current	V_{DS} = 75V, 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	$V_{GS(th)}$	1		3	V
Static Drain-Source On-Resistance	V_{GS} = 10V, I_D = 20A	$R_{DS(ON)}$		10	12	mΩ
Dynamic Characteristics [Note 3]						
Forward Transconductance	V_{DS} = 15V, I_D = 40A	g_{FS}		45		S
Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1MHz	C_{ISS}		3500		pF
Output Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1MHz	C_{OSS}		715		pF
Reverse Transfer Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1MHz	C_{RSS}		70		pF
Switching Characteristics [Note 3]						
Turn-On Delay Time	V_{DD} = 37.5V, V_{GS} = 10V, I_D = 45A, $R_{G(ext)}$ = 4.7Ω	$t_{D(ON)}$		28	56	ns
Turn-On Rise Time	V_{DD} = 37.5V, V_{GS} = 10V, I_D = 45A, $R_{G(ext)}$ = 4.7Ω	t_R		9	18	ns
Turn-Off Delay Time	V_{DD} = 37.5V, V_{GS} = 10V, I_D = 45A, $R_{G(ext)}$ = 4.7Ω	$t_{D(OFF)}$		83	166	ns
Turn-Off Fall Time	V_{DD} = 37.5V, V_{GS} = 10V, I_D = 45A, $R_{G(ext)}$ = 4.7Ω	t_F		10	20	ns
Total Gate Charge	V_{DS} = 60V, V_{GS} = 10V, I_D = 75A	Q_G		90	119	nC
Gate Source Charge	V_{DS} = 60V, V_{GS} = 10V, I_D = 75A	Q_{GS}		19		nC
Gate Drain Charge	V_{DS} = 60V, V_{GS} = 10V, I_D = 75A	Q_{GD}		23		nC
Drain-Source Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Current		I_S			86	A
Drain-Source Diode Forward Voltage [Note 2]	V_{GS} = 0V, I_S = 40A	V_{SD}			1.5	V

Notes

1: Repetitive Rating: Pulse width limited by maximum junction temperature.
2: Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
3: Guaranteed by design, not subject to production testing.
4: L = 0.87mH, I_{AS} = 45A, V_{DD} = 38V, R_G = 25Ω, Starting T_J = 25°C.
5: Pulse width limited by safe operating area.

REFERENCE DATA ▲ TYPICAL DEVICE PERFORMANCE

Fig. 1 ▪ Output Characteristics

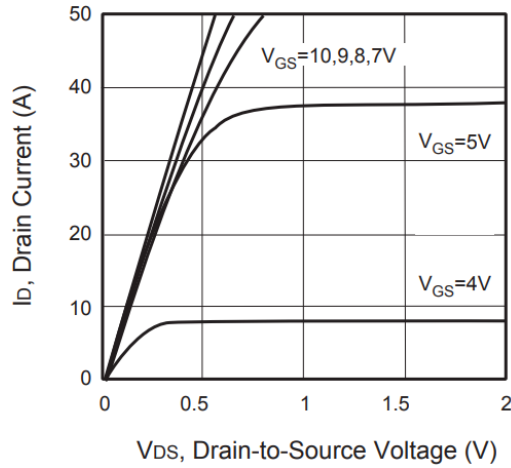### Fig. 2 ▪ Transfer Characteristics
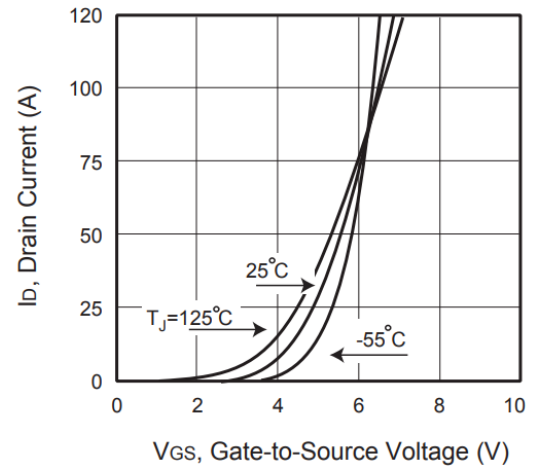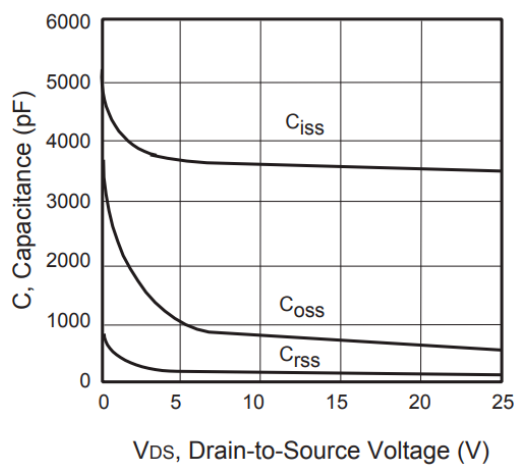

Fig. 3 ▪ Capacitance

Fig. 4 ▪ On-Resistance Variation with Temperature
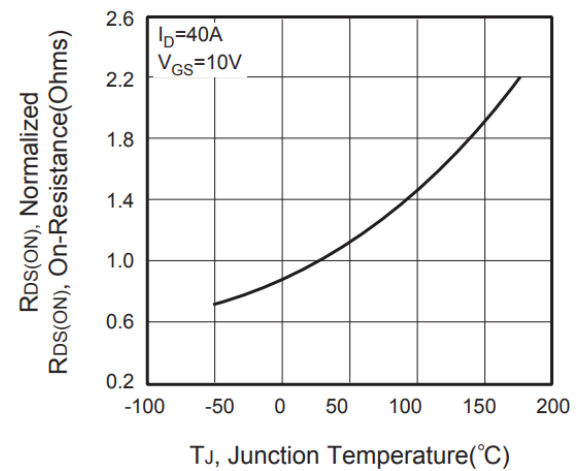

Fig. 5 ▪ Gate Threshold Variation with Temperature
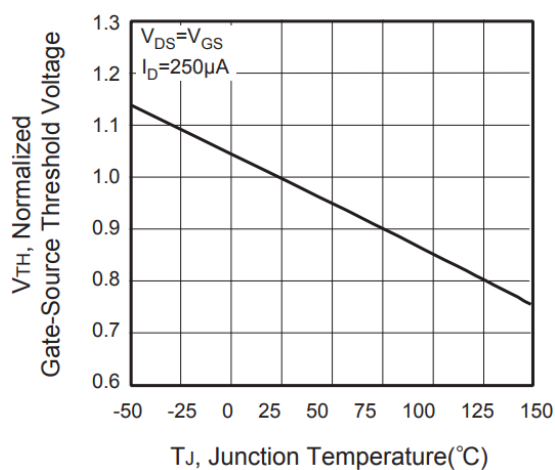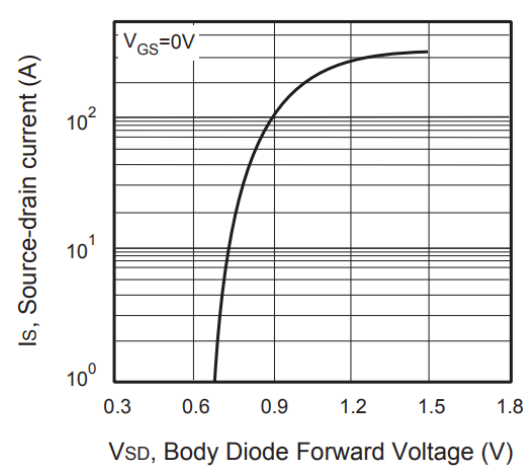

Fig. 6 ▪ Body Diode Forward Voltage Variation with Source Current

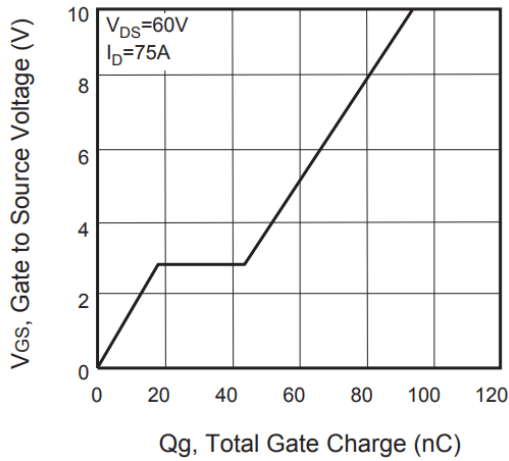# REFERENCE DATA ▲ TYPICAL DEVICE PERFORMANCE

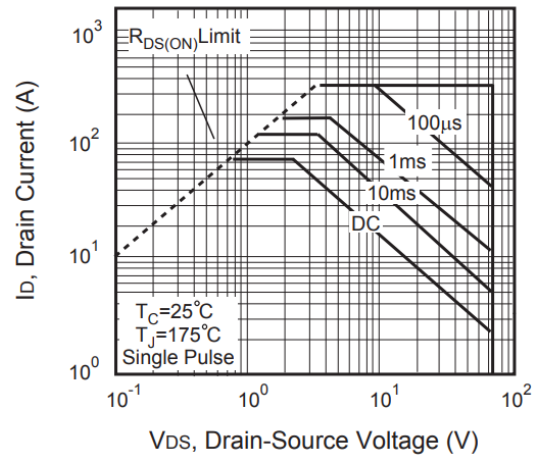| Fig. 7 ▪ Gate Charge	Fig. 8 ▪ Maximum Safe Operating Area

Fig. 7 ▪ Gate Charge

V_{DS}=60V
I_D=75A

V_{GS}, Gate to Source Voltage (V)

Qg, Total Gate Charge (nC)

Fig. 8 ▪ Maximum Safe Operating Area

$R_{DS(ON)}$ Limit

I_D, Drain Current (A)

100μs
1ms
10ms
DC

T_C=25℃
T_J=175℃
Single Pulse

V_{DS}, Drain-Source Voltage (V)

Fig. 9 ▪ Switching Test Circuit	Fig. 10 ▪ Switching Waveforms

Fig. 9 ▪ Switching Test Circuit

V_{DD}
R_L
V_{IN}
D
V_{OUT}
V_{GS}
R_{GEN}
G
S

Fig. 10 ▪ Switching Waveforms

t_{on}
t_{off}
$t_{d(on)}$
t_r
$t_{d(off)}$
t_f
90%
90%
V_{OUT}
10%
INVERTED
10%
90%
V_{IN}
50%
50%
10%
PULSE WIDTH

Fig. 12 ▪ Normalized Thermal Transient Impedance Curve

Fig. 12 ▪ Normalized Thermal Transient Impedance Curve

r(t), Normalized Effective Transient Thermal Impedance

D=0.5
0.2
0.1
0.05
0.02
0.01
Single Pulse

P_{DM}
t_1
t_2

1. R_{JC} (t)=r (t) * R_{JC}
2. R_{JC}=See Datasheet
3. T_{JM}-T_C = P* R_{JC} (t)
4. Duty Cycle, D=t1/t2

Square Wave Pulse Duration (msec)

PART MARKING

Logo → CET

Part number → CEB85N75

Date code → 11S4Z

DATE CODE

Example: 11S4Z

11S4Z

- Year
- Month
- Day
- Serial No.
- Product Type
  Z: Pb-free
  G: Green Product

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

PACKAGE OUTLINE

Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
A	4.37	4.57	4.77
A1	1.22	1.27	1.42
A2	2.49	2.69	2.89
A3	0.00	0.13	0.25
b	0.70	0.81	0.96
b1	1.17	1.27	1.47
c	0.30	0.38	0.53
D1	8.50	8.70	8.90
D4	6.60	-	-

Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
E	9.86	10.16	10.36
E5	7.06	-	-
e	2.54 BSC		
H	14.70	15.10	15.50
H2	1.07	1.27	1.47
L	2.00	2.30	2.60
L1	1.40	1.55	1.70
L4	0.25 BSC		
θ	0°	5°	9°

ORDERING INFORMATION

Part Number	Package	Packing	Reel Qty.	Inner Box Qty.	Outer Box Qty.
CEB85N75	TO263 (D2PAK)	Reel	800pcs	800pcs	6,400pcs

RECOMMENDED PAD LAYOUT
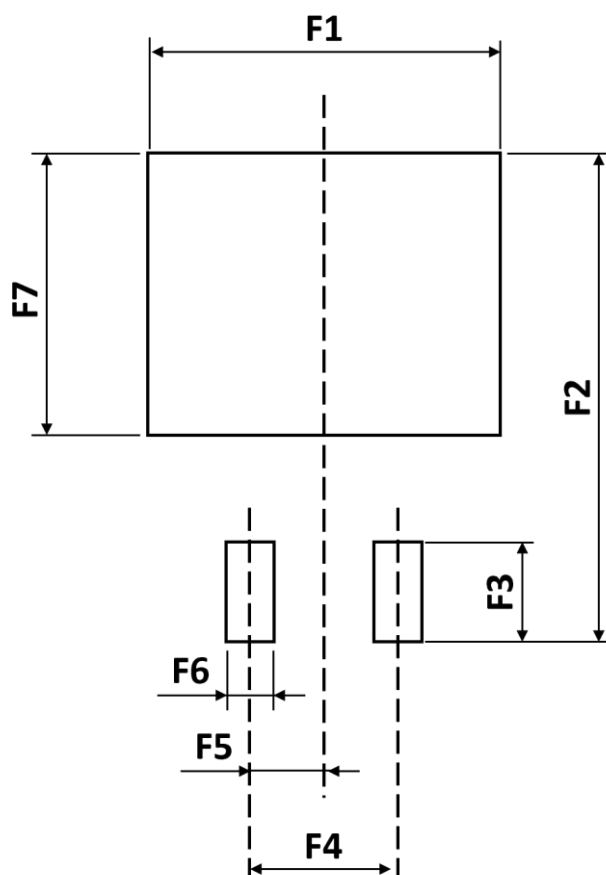
Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
F1	-	12.20	-
F2	-	16.90	-
F3	-	2.54	-
F4	-	5.08	-

| Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
F5	-	2.54	-
F6	-	1.60	-
F7	-	9.75	-

Notes:

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

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

REEL DIMENSIONS ▲ All dimensions in mm
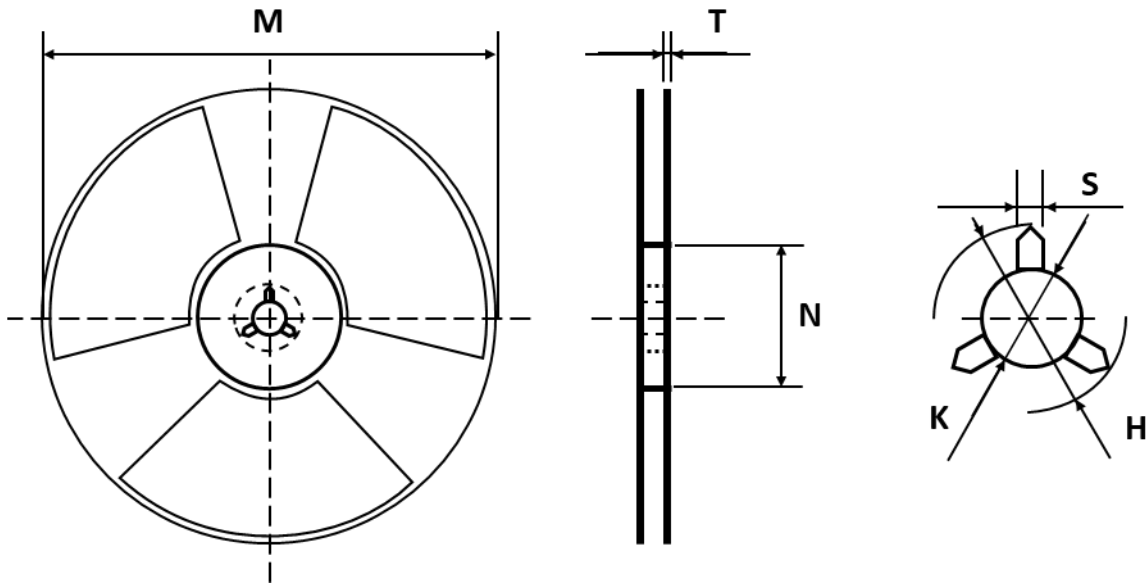
Tape Size	Reel Size	M	N	T	H	K	S
24mm	Ø330	Ø330.00	Ø100.00	2.10	22.00	13.00	2.00
		±2.00	±0.50	±0.20	±0.50	+0.50 -0.20	+0.50 -0.20

TAPE DIMENSIONS ▲ All dimensions in mm
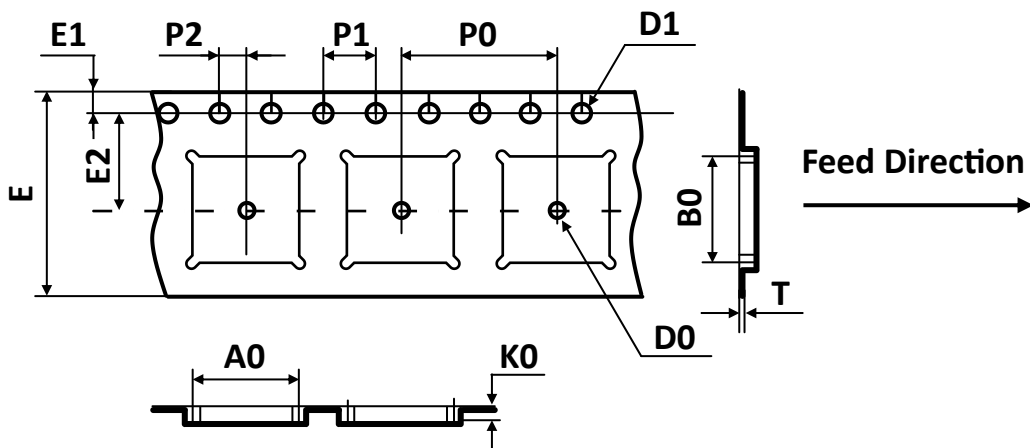
Package	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
TO263 (D²PAK)	10.80	16.30	4.85	1.50	1.55	24.00	1.75	11.50	16.00	4.00	2.00	0.35
	±0.10	±0.10	±0.10	±0.10	±0.05	±0.30	±0.10	±0.10	±0.10	±0.10	±0.10	±0.05

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

RECOMMENDED REFLOW SOLDERING PROFILE
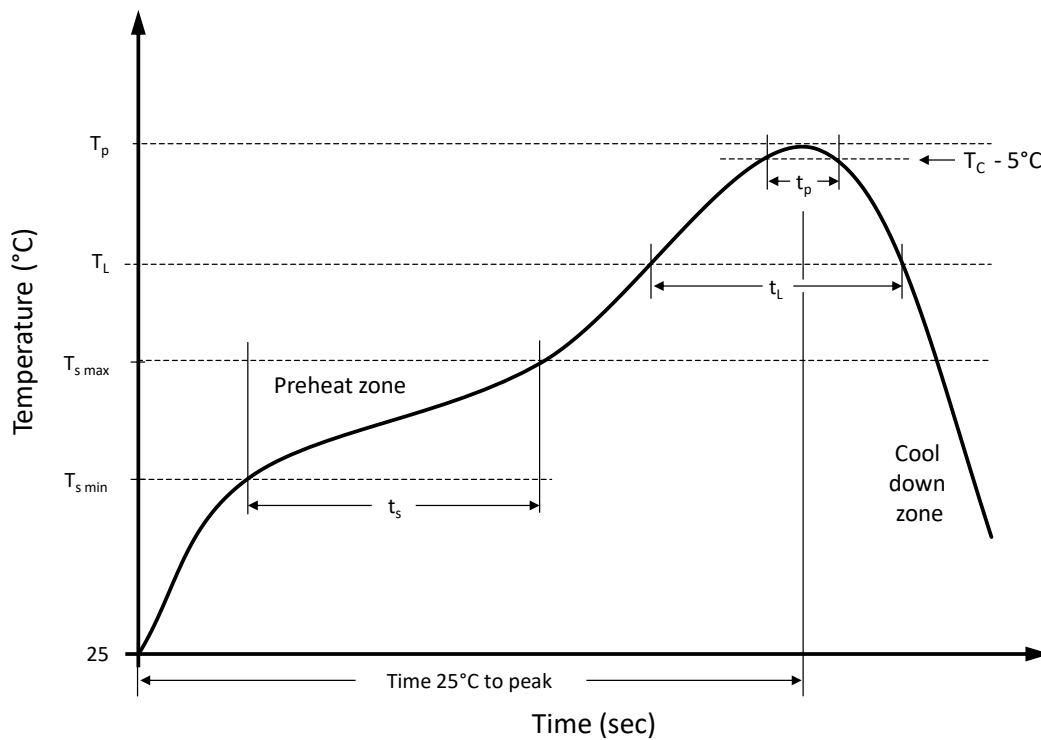
Recommended reflow soldering conditions ▲ Refer to JEDEC J-STD-020E

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

REVISION TABLE

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

DISCLAIMER

Except for the written expressed warranties, MGT does not implicitly, by assumption or whatever else, warrant, under-take, promise any other warranty or guaranty for any MGT product.

All information and technical specifications made available by MGT are for guidance only and we reserve the right to change or modify them without prior notice. Unless expressly stated in writing by MGT, we reject any guarantees, obligations, or warranties.

All MGT products with the technical specifications described are suitable for use in certain applications. Operating, production, storage and environmental conditions can have a massive influence on the parameters mentioned in the data sheets, which cause the performance to vary over time.

It is subject to the user's duty of care to design and validate his products in such a way that appropriate measures are taken, such as protective circuits or redundant systems to ensure the safety standards required in the application.

MGT components are not designed or rated for use in life support, rescue, safety critical, military, or aerospace applications where failure or malfunction could result in property or environmental damage, serious injury or death. In the aforementioned cases, please contact us before using MGT products.

In principle, we reserve all rights and MGT's general terms and conditions apply. You can find them on our website www.mgt.co.com.