



CEW30SM120

1200V ▲ 78mΩ ▲ 30A ▲ SiC MOSFET

SILICON CARBIDE SiC MOSFET ▲ THT type

N-channel enhancement mode

Low on-resistance and capacitance

TO-247-4L package with Kelvin Source connection

Avalanche ruggedness

Elimination of voltage drops over the source inductance

SPECIFICATION

Item (T _c = 25°C, unless otherwise noted)		Characteristics
Operating Temperature Range	T _J	-55°C to +175°C
Storage Temperature Range	T _S	-55°C to +175°C
Drain-Source Voltage	V _{DS MAX}	1200V
Continuous Drain Current	I _D	30A
Drain-Source On-State Resistance ^{Note 1}	R _{DS(ON) TYP}	78mΩ
Reverse Transfer Capacitance ^{Note 2}	C _{RSS}	7pF
Power Dissipation	P _D	170W

Notes

1: V_{GS} = 20V, I_D = 20A

2: V_{DS} = 800V, V_{GS} = 0V, f = 1MHz

APPLICATIONS

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

PIN DESCRIPTION

Circuit Diagram	Outline - Front View	Pin No.	Symbol	Description
		1 2 3 4	D S KS G	Drain Source Kelvin Source Gate



ABSOLUT MAXIMUM RATINGS ▲ $T_C = 25^\circ\text{C}$, unless otherwise noted

Item	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	1200	V
Gate-Source Voltage	V_{GS}	-15/+25	V
Continuous Drain Current at $T_C = 25^\circ\text{C}$	$I_{D_25^\circ\text{C}}$	30	A
Continuous Drain Current at $T_C = 100^\circ\text{C}$	$I_{D_100^\circ\text{C}}$	21	A
Pulsed Drain Current ^{Note 3}	I_{DM}	116	A
Maximum Power Dissipation at $T_C = 25^\circ\text{C}$	$P_{D_25^\circ\text{C}}$	170	W
Maximum Power Dissipation Derating above $T_C = 25^\circ\text{C}$	$P_{DERATING}$	28	W/ $^\circ\text{C}$
Single Pulsed Avalanche Energy ^{Note 4}	E_{AS}	171	mJ
Single Pulsed Avalanche Current ^{Note 4}	I_{AS}	18.5	A
Operating Junction Temperature	T_J	-55 to +175	$^\circ\text{C}$
Storage Temperature Range	T_{STG}	-55 to +175	$^\circ\text{C}$

THERMAL RESISTANCE PERFORMANCE

Item	Symbol	Limit	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.86	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	40	$^\circ\text{C}/\text{W}$

Notes

- 3: Repetitive Rating: Pulse width limited by maximum junction temperature.
 4: $L = 1\text{mH}$, $I_{AS} = 18.5\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$.

ELECTRICAL CHARACTERISTICS ▲ $T_J = 25^\circ\text{C}$, unless otherwise noted

Item	Condition	Symbol	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 100\mu A$	BV_{DSS}	1200			V
Zero Gate Voltage Drain Current	$V_{DS} = 1200V, V_{GS} = 0V$	I_{DSS}			100	μA
Gate Body Leakage Current, Forward	$V_{GS} = 25V, V_{DS} = 0V$	I_{GSSF}			1	μA
Gate Body Leakage Current, Reverse	$V_{GS} = -15V, V_{DS} = 0V$	I_{GSSR}	-1			μA

Item	Condition	Symbol	Min.	Typ.	Max.	Unit
On Characteristics ^{Note 5}						
Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\mu A$	$V_{GS(TH)}$	1.7		4.4	V
Static Drain-Source On-Resistance	$V_{GS} = 20V, I_D = 20A$	$R_{DS(ON)}$		78	110	m Ω

Item	Condition	Symbol	Min.	Typ.	Max.	Unit
Dynamic Characteristics ^{Note 6}						
Input Capacitance	$V_{DS} = 800V, V_{GS} = 0V, f = 1MHz$	C_{ISS}		1100		pF
Output Capacitance	$V_{DS} = 800V, V_{GS} = 0V, f = 1MHz$	C_{OSS}		85		pF
Reverse Transfer Capacitance	$V_{DS} = 800V, V_{GS} = 0V, f = 1MHz$	C_{RSS}		7		pF
E_{OSS} Stored Energy	$V_{DS} = 800V, V_{GS} = 0V, f = 1MHz$	E_{OSS}		32		μJ

Item	Condition	Symbol	Min.	Typ.	Max.	Unit
Switching Characteristics ^{Note 6}						
Turn-On Delay Time	$V_{DD} = 800V, I_D = 20A, V_{GS} = -5/+20V; R_G = 4.7\Omega$	$t_{D(ON)}$		15		ns
Turn-On Rise Time	$V_{DD} = 800V, I_D = 20A, V_{GS} = -5/+20V; R_G = 4.7\Omega$	t_R		22		ns
Turn-Off Delay Time	$V_{DD} = 800V, I_D = 20A, V_{GS} = -5/+20V; R_G = 4.7\Omega$	$t_{D(OFF)}$		55		ns
Turn-Off Fall Time	$V_{DD} = 800V, I_D = 20A, V_{GS} = -5/+20V; R_G = 4.7\Omega$	t_F		84		ns
Turn-On Switching Loss	$V_{DD} = 800V, I_D = 20A, V_{GS} = -5/+20V; R_G = 4.7\Omega$	E_{ON}		310		μJ
Turn-Off Switching Loss	$V_{DD} = 800V, I_D = 20A, V_{GS} = -5/+20V; R_G = 4.7\Omega$	E_{OFF}		30		μJ
Total Switching Loss	$V_{DD} = 800V, I_D = 20A, V_{GS} = -5/+20V; R_G = 4.7\Omega$	E_{TS}		340		μJ
Total Gate Charge	$V_{DS} = 600V, I_D = 20A, V_{GS} = -5/+20V$	Q_G		40		nC
Gate-Source Charge	$V_{DS} = 600V, I_D = 20A, V_{GS} = -5/+20V$	Q_{GS}		6		nC
Gate-Drain Charge	$V_{DS} = 600V, I_D = 20A, V_{GS} = -5/+20V$	Q_{GD}		11		nC

Item	Condition	Symbol	Min.	Typ.	Max.	Unit
Drain-Source Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Voltage ^{Note 5}	$V_{GS} = -5V, I_S = 10A$	V_{SD}		3.7		V
Reverse Recovery Energy	$I_S = 20A, V_{GS} = 5V, V_R = 600V, di_{SD}/dt=1000A/\mu s$	E_{REC}		30		μJ
Diode Reverse Recovery Time	$I_S = 20A, V_{GS} = 5V, V_R = 600V, di_{SD}/dt=1000A/\mu s$	t_{RR}		18		ns
Diode Reverse Recovery Charge	$I_S = 20A, V_{GS} = 5V, V_R = 600V, di_{SD}/dt=1000A/\mu s$	Q_{RR}		81		nC

Notes

- 5: Pulse Test: Pulse Width < 300 μs , Duty Cycle < 2%.
- 6: Guaranteed by design, not subject to production testing.

REFERENCE DATA ▲ TYPICAL DEVICE PERFORMANCE

Fig. 1 • Output Characteristics

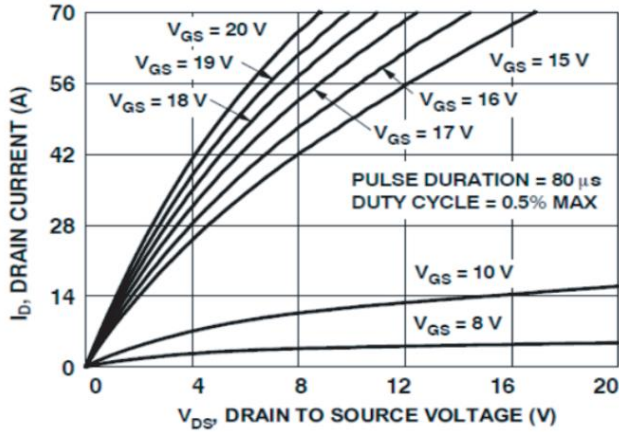


Fig. 2 • Normalized On-Resistance vs. Drain Current and Gate Voltage

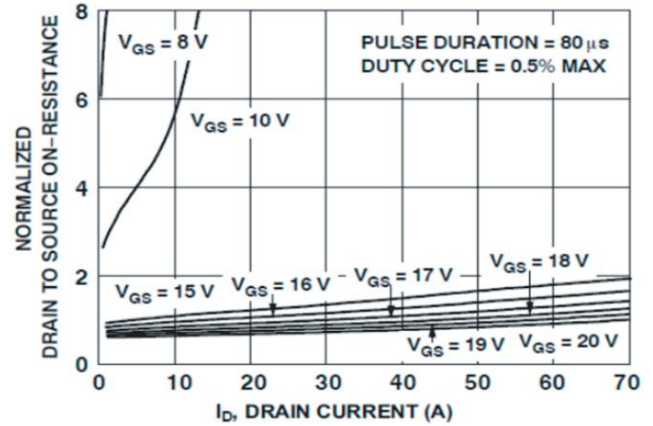


Fig. 3 • Normalized On-Resistance vs. Junction Temperature

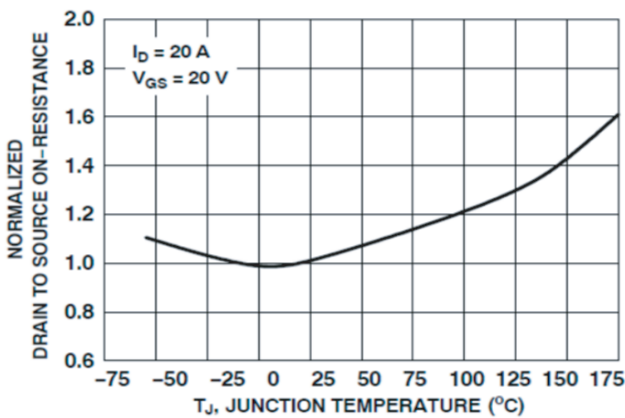


Fig. 4 • On-Resistance vs. Gate to Source Voltage

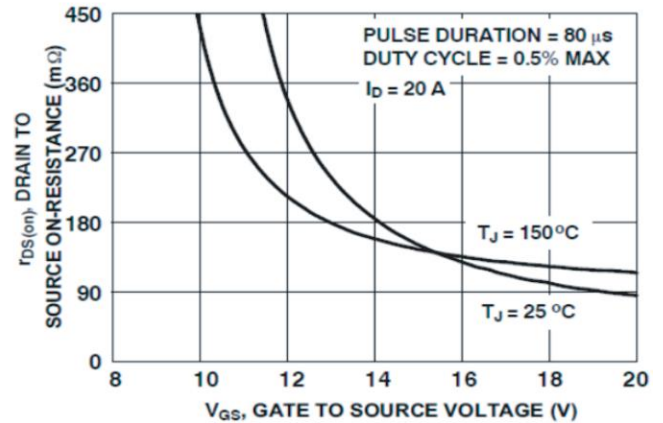


Fig. 5 • Transfer Characteristic

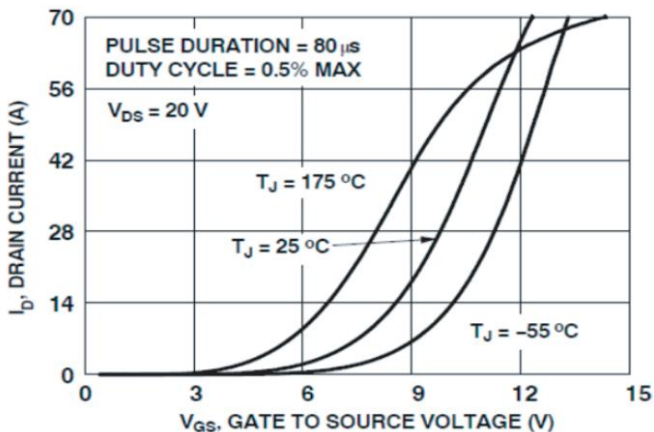
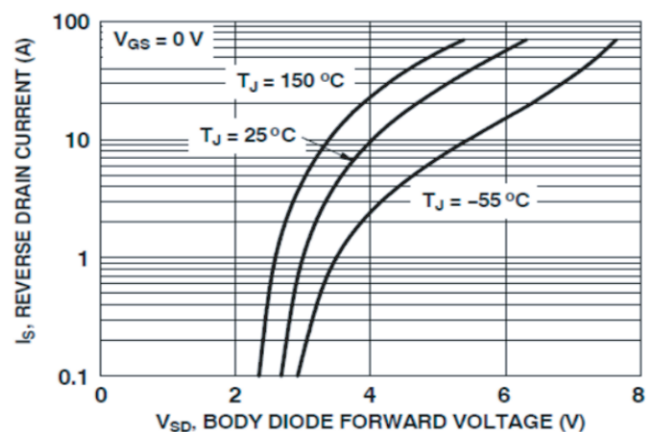


Fig. 6 • Body Diode Characteristic



REFERENCE DATA ▲ TYPICAL DEVICE PERFORMANCE

Fig. 7 • Gate Charge

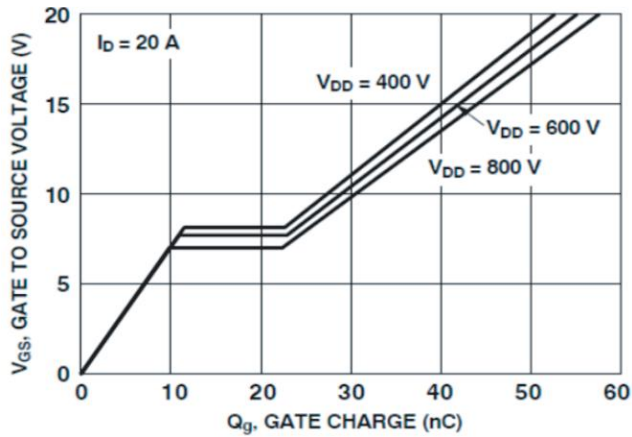


Fig. 8 • Capacitance

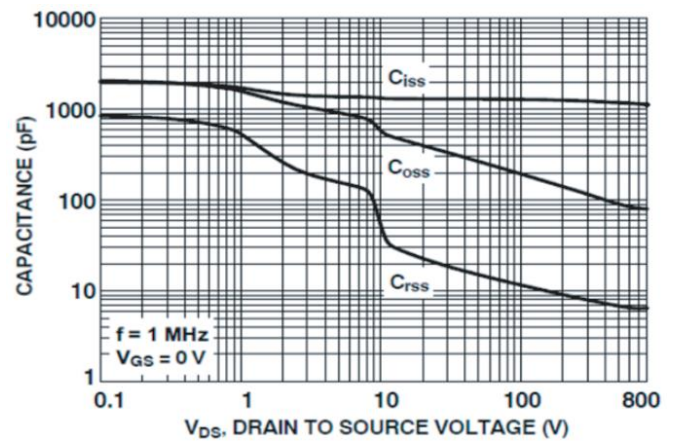


Fig. 9 • Unclamped Inductive Switching Capability

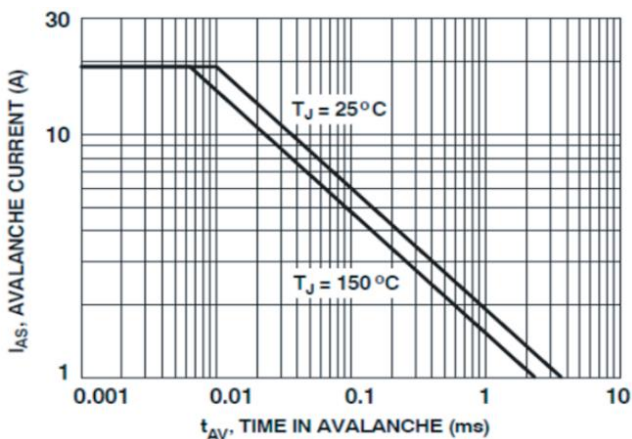


Fig. 10 • Maximum Continuous Drain Current vs. Case Temperature

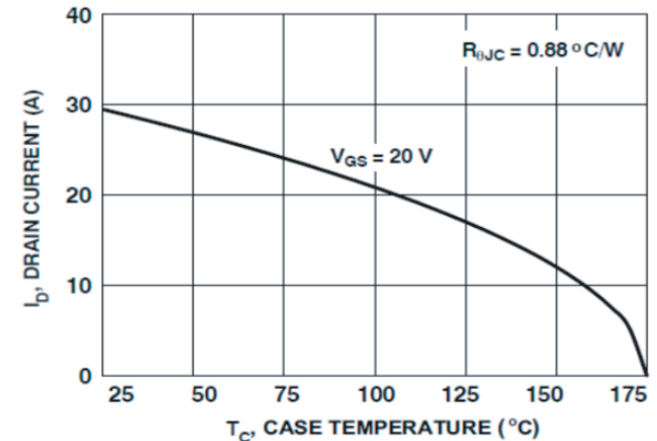


Fig. 11 • Safe Operating Area

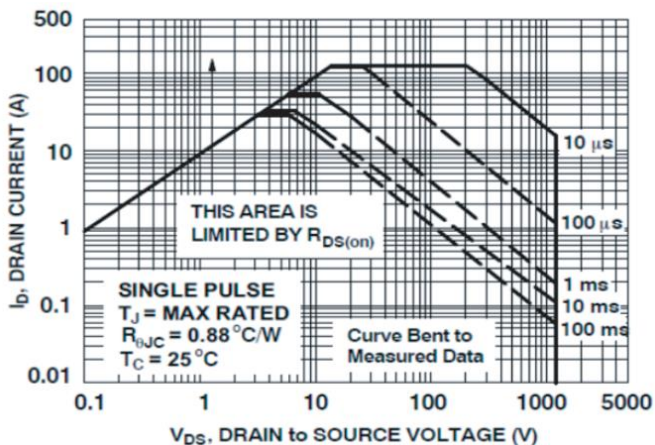
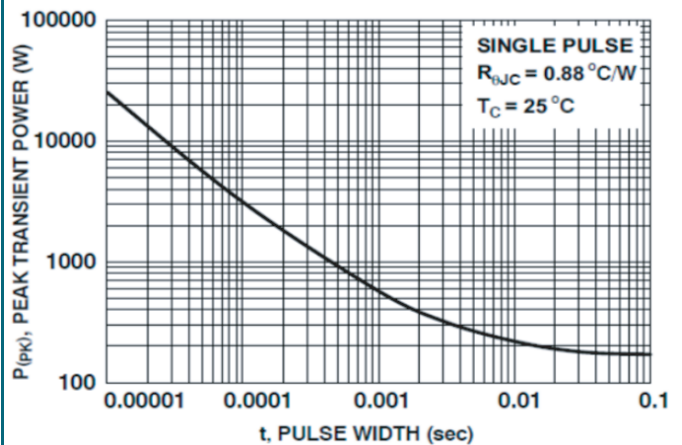
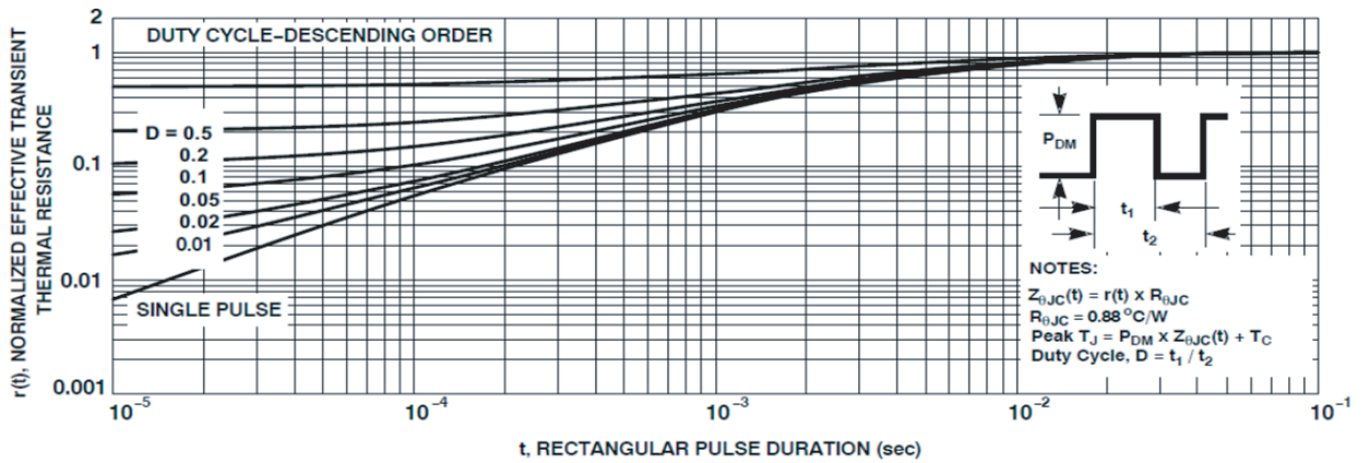


Fig. 12 • Single Pulse Maximum Power Dissipation

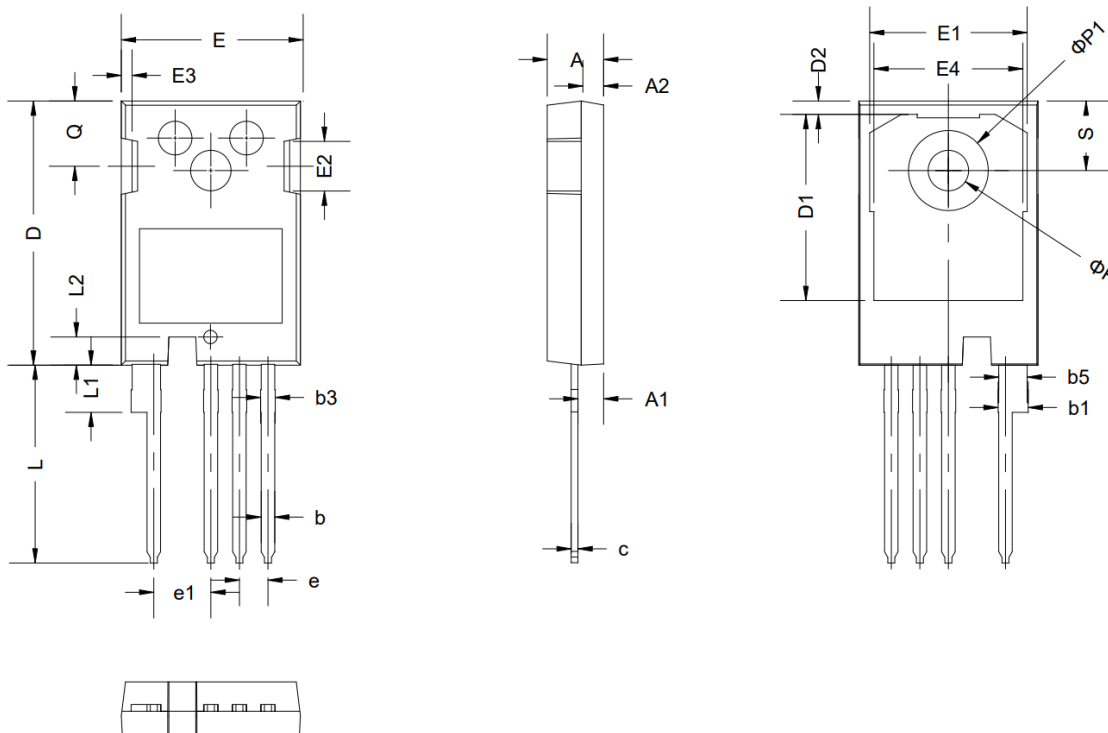


REFERENCE DATA ▲ TYPICAL DEVICE PERFORMANCE

Fig. 13 • Normalized Thermal Transient Impedance Curve



PACKAGE OUTLINE



Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
A	4.83	5.02	5.21
A1	2.29	2.41	2.54
A2	1.91	2.00	2.16
b	1.07	1.20	1.33
b1	2.39	2.67	2.84
b3	1.07	1.30	1.60
B5	2.39	2.53	2.69
c	0.55	0.60	0.68
D	23.30	23.45	23.60
D1	16.25	16.55	17.65
D2	0.95	1.19	1.25
E	15.75	15.94	16.13
E1	13.10	14.02	14.15

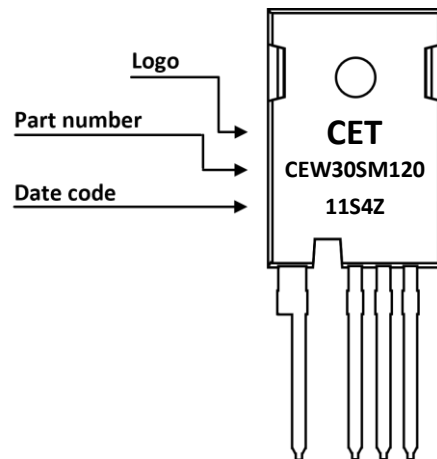
Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
E2	3.68	4.40	5.10
E3	1.00	1.45	1.90
E4	12.38	13.26	13.43
e	2.54 BSC		
e1	5.08 BSC		
L	17.31	17.57	17.82
L1	3.97	4.19	4.37
L2	2.35	2.50	2.65
ØP	3.51	3.61	3.65
ØP1	7.19 REF		
Q	5.49	5.79	6.00
S	6.04	6.17	6.30

TO-247-4L package ▲ Epoxy meets UL94-V0

ORDERING INFORMATION

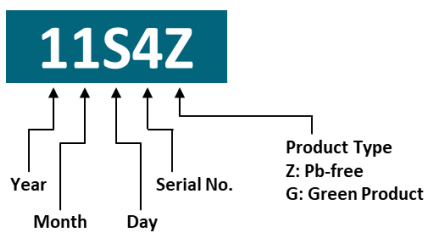
Part Number	Package	Packing	Tube Qty.	Inner Box Qty.	Outer Box Qty.
CEW30SM120	TO-247-4L	Tube	30pcs	450pcs	1,800pcs

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									

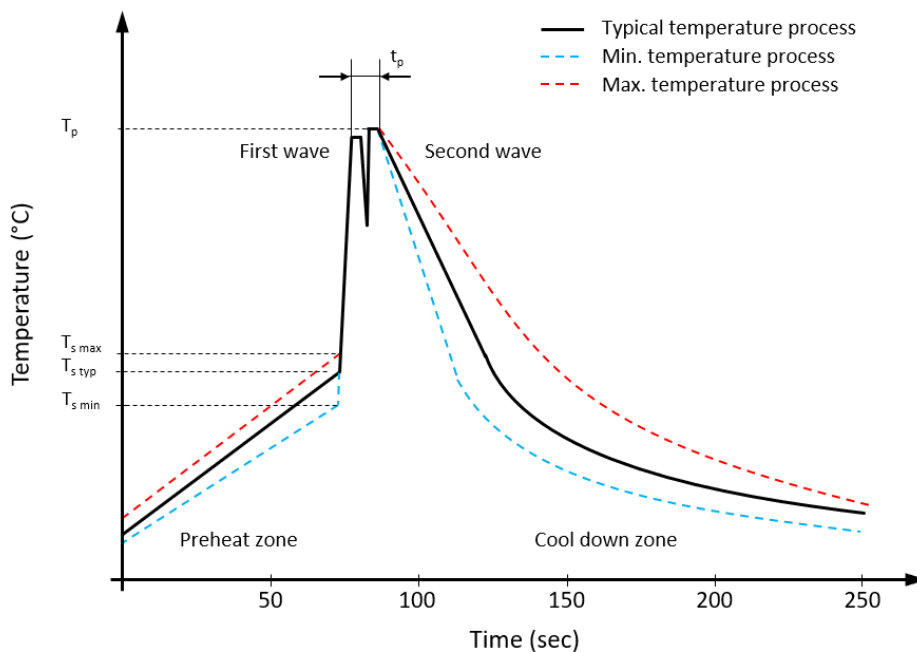
Coding list for „Month“

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

RECOMMENDED WAVE SOLDERING PROFILE ▲ THT PACKAGE



Classification wave soldering profile ▲ Refer to EN 61760-1: 2006

Profile Features		Value ▲ Sn-Pb Assembly	Value ▲ Pb-free Assembly
Preheat temperature min.	$T_{s\ min}$	100 °C	100 °C
Preheat temperature typical	$T_{s\ typ}$	120 °C	120 °C
Preheat temperature max.	$T_{s\ max}$	130 °C	130 °C
Preheat time t_s from $T_{s\ min}$ to $T_{s\ max}$	t_s	70 seconds	70 seconds
Peak temperature	T_p	235 °C to 260 °C	245 °C to 260 °C
Time of actual peak temperature	t_p	Max. 10 seconds Max. 5 second each wave	Max. 10 seconds Max. 5 second each wave
Ramp-down rate min.		~ 2 °C/second	~ 2 °C/second
Ramp-down rate typical		~ 3.5 °C/second	~ 3.5 °C/second
Ramp-down rate max.		~ 5 °C/second	~ 5 °C/second
Time 25°C to 25°C		4 minutes	4 minutes



REVISION TABLE

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

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