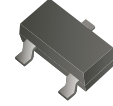


# CMSN2304A-HF

N-Channel  
RoHS Device  
Halogen Free



## Features

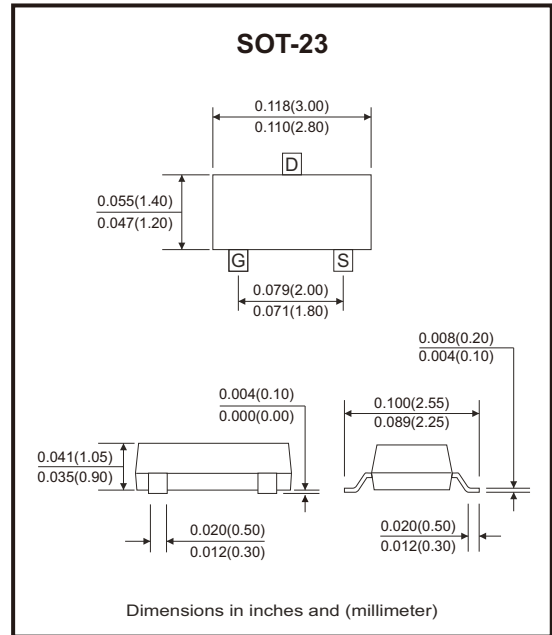
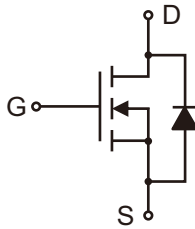
- High power and current handing capability.

## Mechanical data

- Case: SOT-23, molded plastic.
- Mounting position: Any.

## Circuit Diagram

G : GATE  
S : SOURCE  
D : DRAIN



## Maximum Ratings (at Ta=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-source voltage	V <sub>DS</sub>	30	V
Gate-source voltage	V <sub>GS</sub>	±20	V
Drain current	I <sub>D</sub>	T <sub>A</sub> =25°C	3.6
		T <sub>A</sub> =70°C	2.9
Pulsed drain current (Note 1)	I <sub>DM</sub>	15	A
Total power dissipation	P <sub>D</sub>	T <sub>A</sub> =25°C	1
		T <sub>A</sub> =70°C	0.6
Thermal resistance junction to ambient (Note 2)	R <sub>θJA</sub>	125	°C/W
Junction and storage temperature range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

Notes: 1. Pulse width ≤ 300μs, duty cycle ≤ 2%.

2. R<sub>θJA</sub> is the sum of the junction-to-case and case-to-ambient thermal resistance, where the case thermal reference is defined as the solder mounting surface of the drain pins. R<sub>θJC</sub> is guaranteed by design, while R<sub>θJA</sub> is determined by the board design. The maximum rating presented here is based on mounting on a 1 in<sup>2</sup> pad 2oz copper.

## Electrical Characteristics (at T<sub>J</sub>=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
<b>Static Parameters</b>						
Drain-source breakdown voltage	BV <sub>DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA	30			V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V			1	μA
Gate-body leakage current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V			±100	nA
Gate threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	1	1.5	2.2	V
Static drain-source on-resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 3.6A		26	33	mΩ
		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 3A		39	48	
Diode forward voltage	V <sub>SD</sub>	I <sub>S</sub> = 3.6A, V <sub>GS</sub> = 0V			1.2	V
<b>Dynamic Parameters</b>						
Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V, f = 1MHz		314		pF
Output capacitance	C <sub>oss</sub>			59		
Reverse transfer capacitance	C <sub>rss</sub>			48		
<b>Switching Parameters</b>						
Total gate charge	Q <sub>g</sub>	V <sub>GS</sub> = 10V, V <sub>DS</sub> = 15V, I <sub>D</sub> = 3.6A		6.08		nC
Gate source charge	Q <sub>gs</sub>			1.26		
Gate drain charge	Q <sub>gd</sub>			1.32		
Reverse recovery charge	Q <sub>rr</sub>	I <sub>F</sub> = 3.6A, di/dt = 100A/μs		1.66		ns
Reverse recovery time	t <sub>rr</sub>			17.33		
Turn-on delay time	t <sub>d(on)</sub>	V <sub>GS</sub> = 10V, V <sub>DS</sub> = 15V, R <sub>L</sub> = 4.1Ω, R <sub>GEN</sub> = 3Ω		3.8		ns
Turn-on rise time	t <sub>r</sub>			23.2		
Turn-off delay time	t <sub>d(off)</sub>			7		
Turn-off fall time	t <sub>f</sub>			18.6		

## Typical Rating and Characteristic Curves (CMSN2304A-HF)

Fig.1 - Output Characteristics

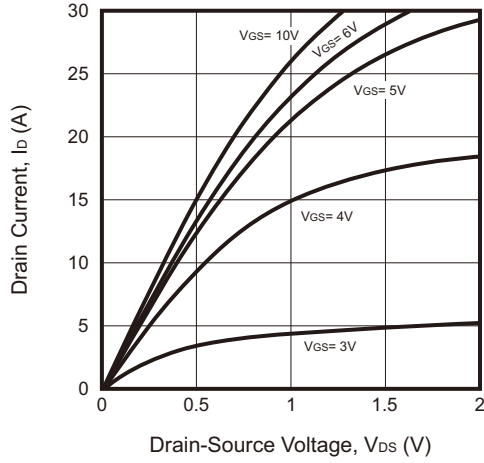


Fig.2 - Transfer Characteristics

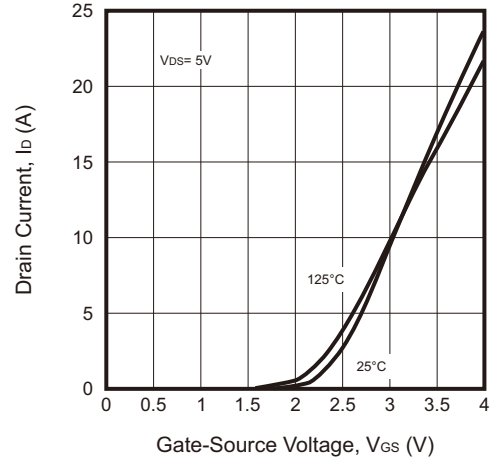


Fig.3 - On-Resistance vs. Drain Current and Gate Voltage

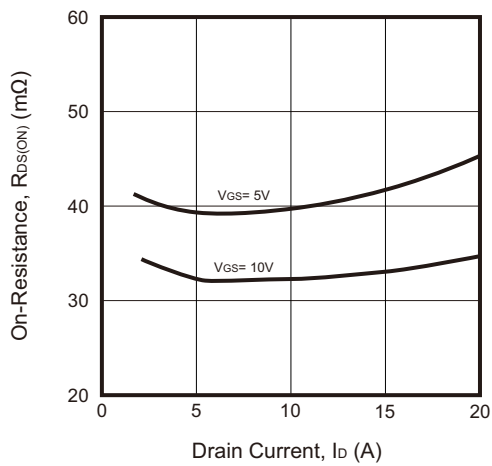


Fig.4 - On-Resistance vs. Junction Temperature

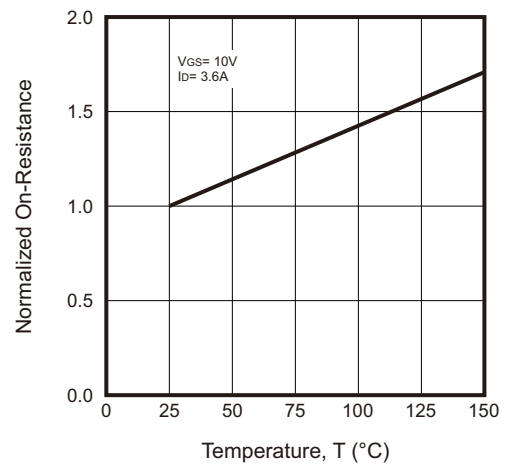


Fig.5 - Capacitance Characteristics

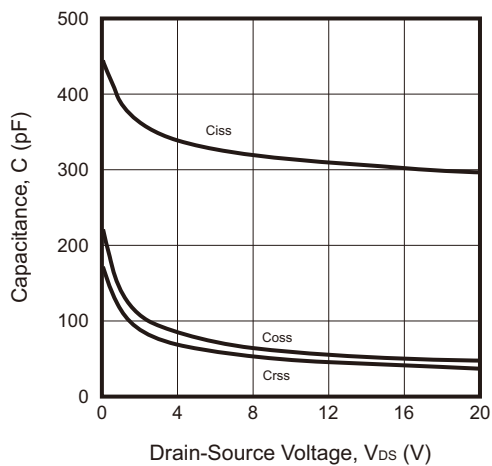
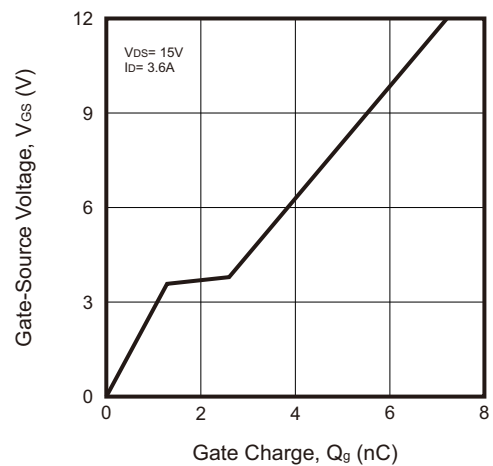


Fig.6 - Gate Charge



## Typical Rating and Characteristic Curves (CMSN2304A-HF)

Fig.7 - Safe Operation Area

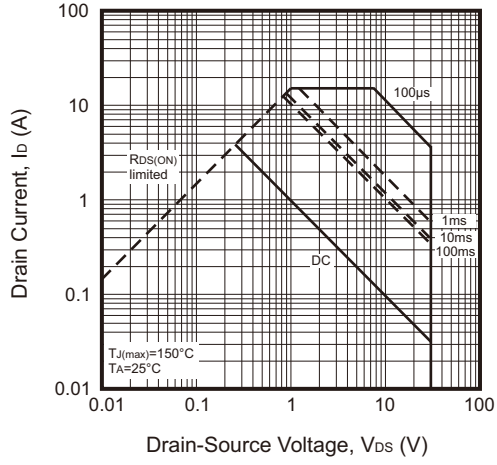
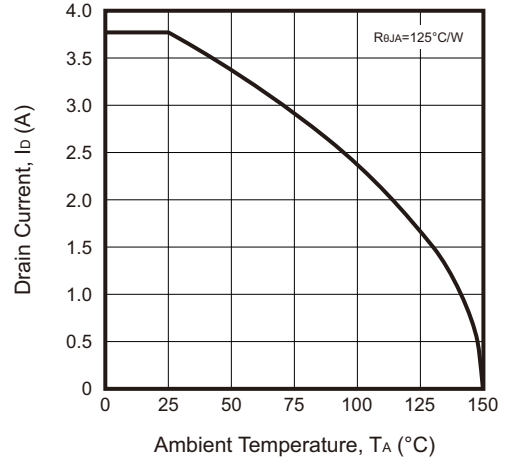
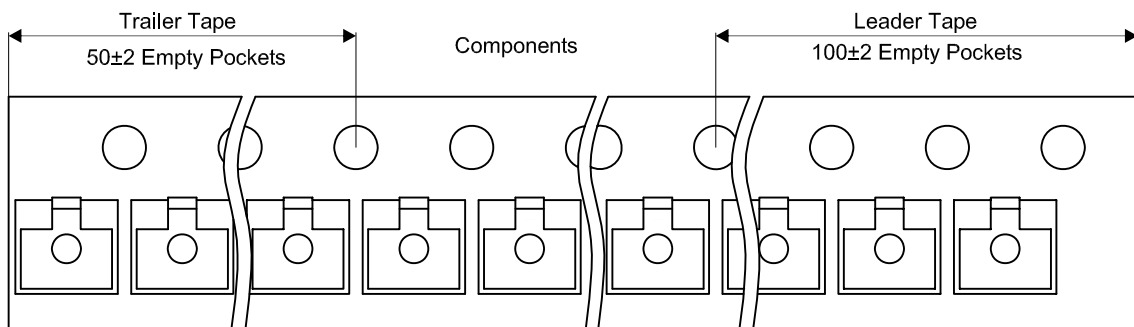
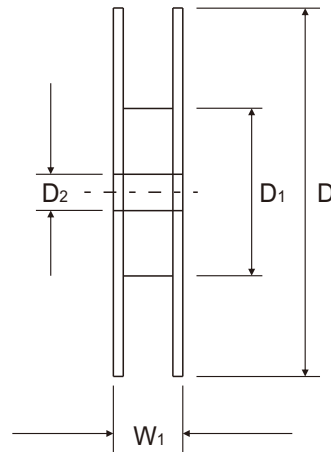
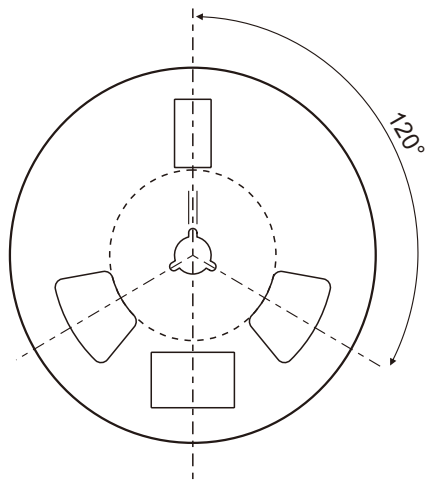
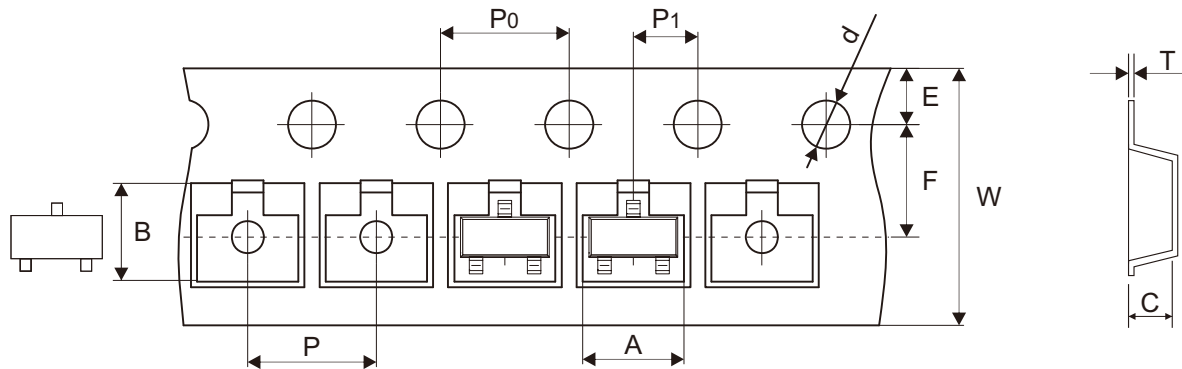


Fig.8 - Maximum Continuous Drain Current vs Ambient Temperature



## Reel Taping Specification

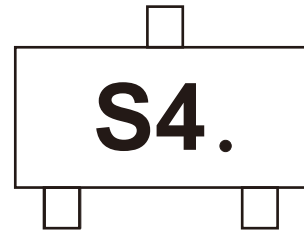


SOT-23	SYMBOL	A	B	C	d	D	D1	D2
	(mm)	3.15 ± 0.10	2.77 ± 0.10	1.22 ± 0.10	1.50 + 0.10 - 0.00	178.00 ± 2.00	54.40 ± 1.00	13.00 ± 1.00
	(inch)	0.124 ± 0.004	0.109 ± 0.004	0.048 ± 0.004	0.059 + 0.004 - 0.000	7.008 ± 0.079	2.142 ± 0.039	0.512 ± 0.039

SOT-23	SYMBOL	E	F	P	P0	P1	T	W	W1
	(mm)	1.75 ± 0.10	3.50 ± 0.05	4.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	0.20 ± 0.02	8.00 + 0.30 - 0.10	12.30 ± 1.00
	(inch)	0.069 ± 0.004	0.138 ± 0.002	0.157 ± 0.004	0.157 ± 0.004	0.079 ± 0.002	0.008 ± 0.001	0.315 + 0.012 - 0.004	0.484 ± 0.039

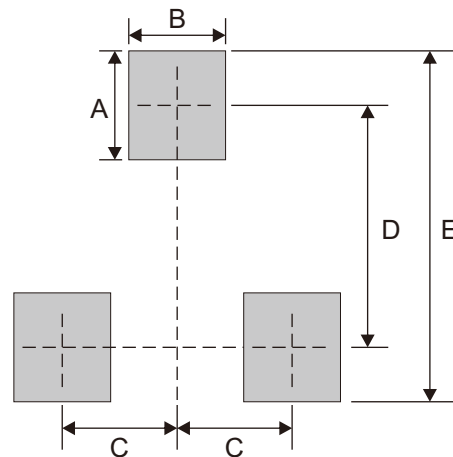
## Marking Code

Part Number	Marking Code
CMSN2304A-HF	S4.



## Suggested P.C.B. PAD Layout

SIZE	SOT-23	
	(mm)	(inch)
A	0.90	0.035
B	0.80	0.031
C	0.95	0.037
D	2.00	0.079
E	2.90	0.114



## Standard Packaging

Case Type	REEL PACK	
	REEL (pcs)	Reel Size (inch)
SOT-23	3,000	7