

CMS09N10D-HF

**N-Channel
RoHS Device
Halogen Free**



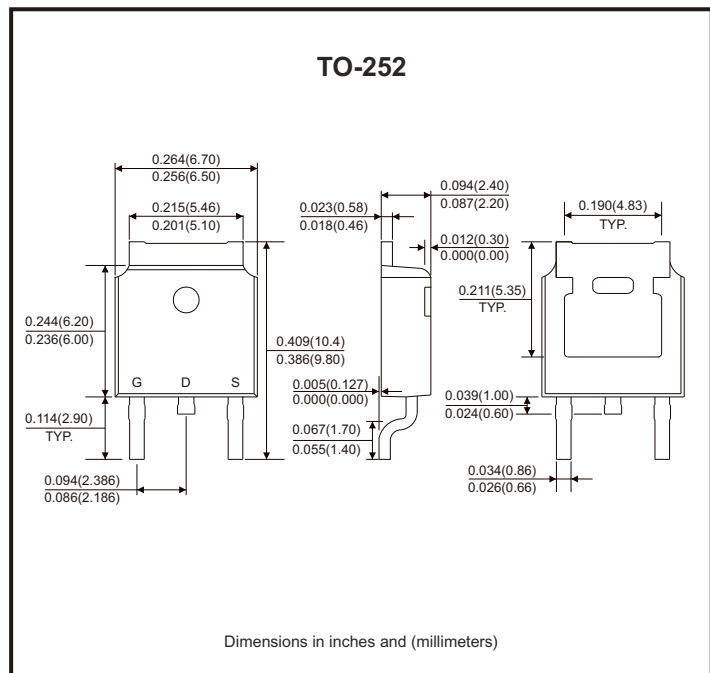
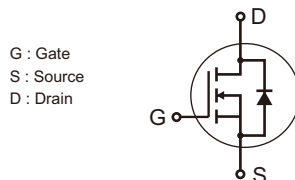
Features

- High density cell design for ultra low R_{dson} .
- Fully characterized avalanche voltage and current.
- Good stability and uniformity with high EAS.
- Excellent package for good heat dissipation.
- Special process technology for high ESD capability.

Mechanical data

- Case: TO-252, molded plastic.
- Mounting position: Any.

Circuit Diagram



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

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	100	V
Gate-source voltage	V_{GS}	± 20	V
Drain current-continuous	I_D	9.6	A
Drain current-continuous ($T_c = 100^\circ\text{C}$)	$I_D(100^\circ\text{C})$	6.5	A
Pulsed drain current	I_{DM}	38.4	A
Maximum power dissipation	P_D	30	W
Derating factor		0.2	$W/^\circ\text{C}$
Single pulse avalanche energy (Note 1)	E_{AS}	20	mJ
Thermal resistance, junction-to-case (Note 2)	$R_{\theta JC}$	5	$^\circ\text{C/W}$
Operating junction and storage temperature range	T_J, T_{STG}	-55 to +175	$^\circ\text{C}$

Notes: 1. EAS condition: $T_J=25^\circ\text{C}$, $V_{DD}=50\text{V}$, $V_G=10\text{V}$, $L=0.5\text{mH}$, $R_G=25\Omega$.
2. Surface mounted on FR4 board, $t \leq 10\text{sec}$.
3. Pulse width limited by maximum junction temperature.

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Electrical Characteristics (at T_c=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Off characteristics						
Drain-source breakdown voltage	B _{VDS}	V _{GS} = 0V, I _D = 250μA	100	110		V
Zero gate voltage drain current	I _{DSS}	V _{DS} = 100V, V _{GS} = 0V			1	μA
Gate-body leakage current	I _{GSS}	V _{GS} = ±20V, V _{DS} = 0V			±100	nA
On characteristics (Note 1)						
Gate threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	1.2	1.8	2.5	V
Drain-source on-state resistance	R _{DS(ON)}	V _{GS} = 10V, I _D = 6A		108	140	mΩ
Forward transconductance	g _{FS}	V _{DS} = 25V, I _D = 6A	3.5			S
Dynamic characteristics (Note 2)						
Input capacitance	C _{iss}	V _{DS} = 25V, V _{GS} = 0V, f = 1MHz		690		pF
Output capacitance	C _{oss}			120		
Reverse transfer capacitance	C _{rss}			90		
Switching characteristics (Note 2)						
Turn-on delay time	t _{d(on)}	V _{DD} = 30V, I _D = 2A, R _L = 15Ω V _{GS} = 10V, R _G = 2.5Ω		11		ns
Turn-on rise time	t _r			7.4		
Turn-off delay time	t _{d(off)}			35		
Turn-off fall time	t _f			9.1		
Total gate charge	Q _g	V _{DS} = 30V, I _D = 3A, V _{GS} = 10V		15.5		nC
Gate-source charge	Q _{gs}			3.2		
Gate-drain charge	Q _{gd}			4.7		
Drain-source diode characteristics						
Diode forward voltage (Note 1)	V _{SD}	V _{GS} = 0V, I _S = 9.6A			1.2	V
Diode forward current (Note 3)	I _S				9.6	A
Reverse recovery time	t _{rr}	T _J = 25°C, I _F = 9.6A		21		ns
Reverse recovery charge	Q _{rr}	di / dt = 100A/μs (Note 1)		97		nC
Forward turn-on time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS + LD)				

- Notes: 1. Pulse width ≤ 300μs, duty cycle ≤ 2%.
 2. Guaranteed by design, not subject to production.
 3. Surface mounted on FR4 board, t ≤ 10 sec.
 4. Pulse width limited by maximum junction temperature.

Rating and Characteristic Curves (CMS09N10D-HF)

Fig.1 - Output Characteristics

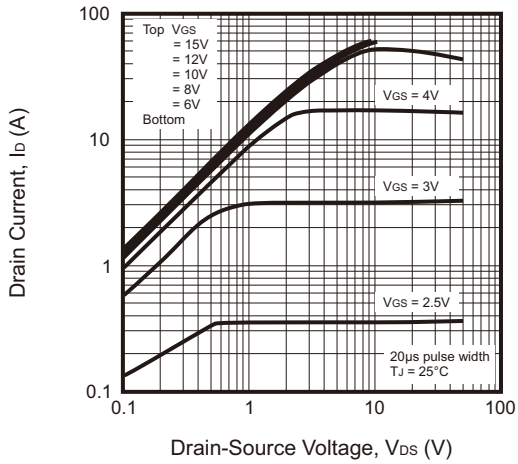


Fig.2 - $R_{DS(ON)}$ -Junction Temperature

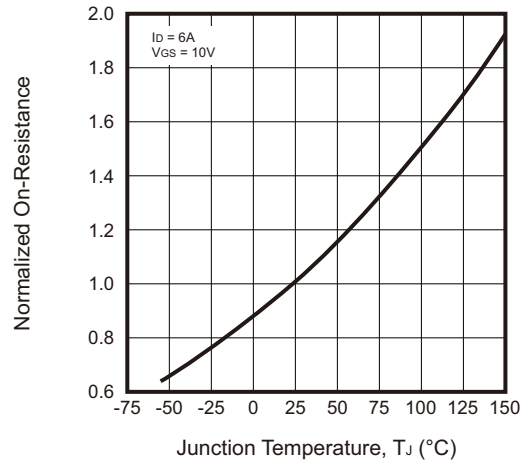


Fig.3 - Transfer Characteristics

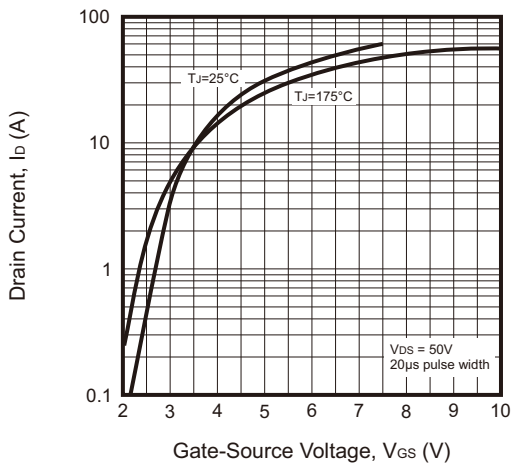


Fig.4 - Gate Charge

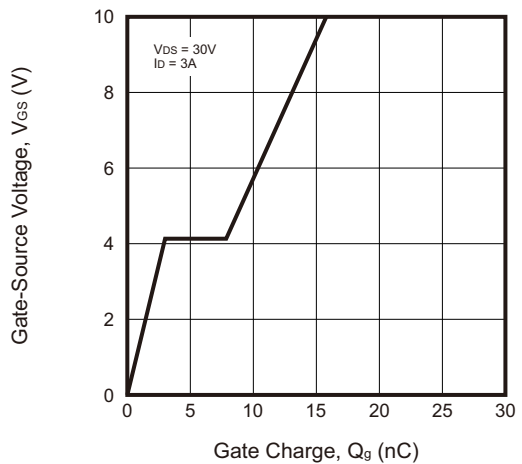


Fig.5 - $R_{DS(ON)}$ -Drain Current

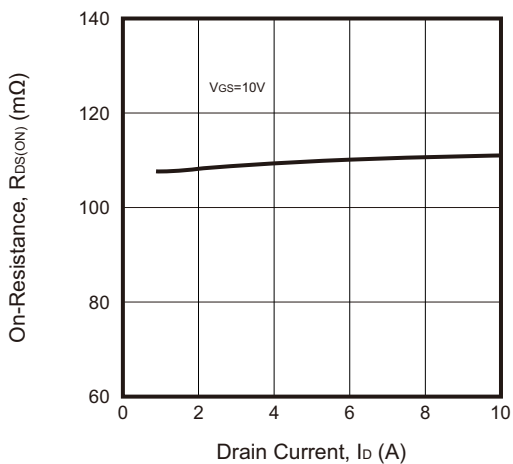
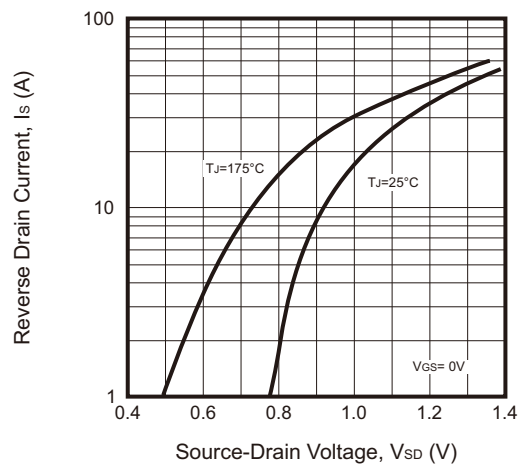


Fig.6 - Source-Drain Diode Forward



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Rating and Characteristic Curves (CMS09N10D-HF)

Fig.7 - Capacitance vs V_{DS}

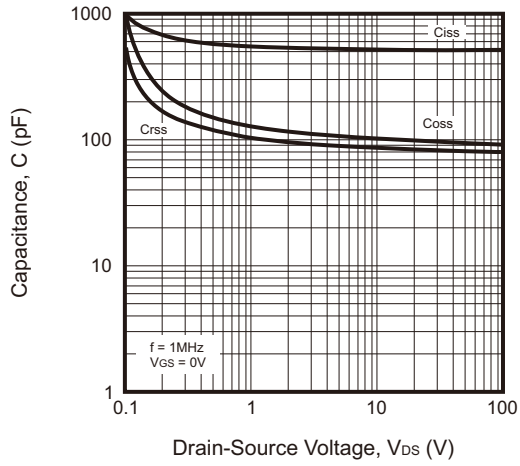


Fig.8 - BV_{DSS} vs Junction Temperature

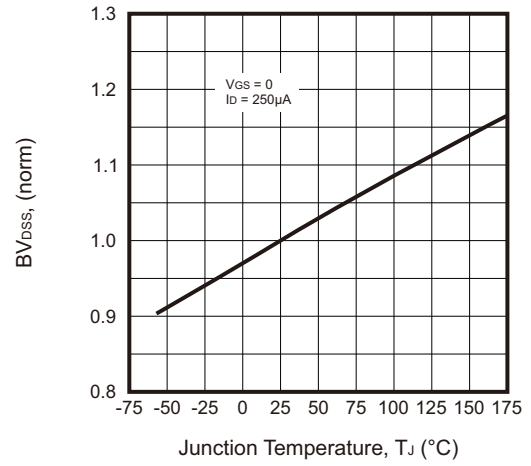


Fig.9 - Safe Operation Area

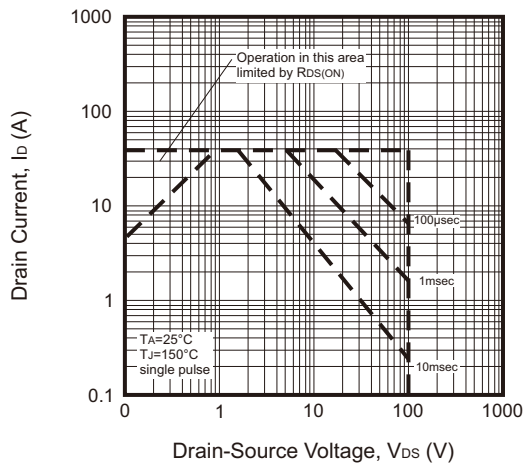
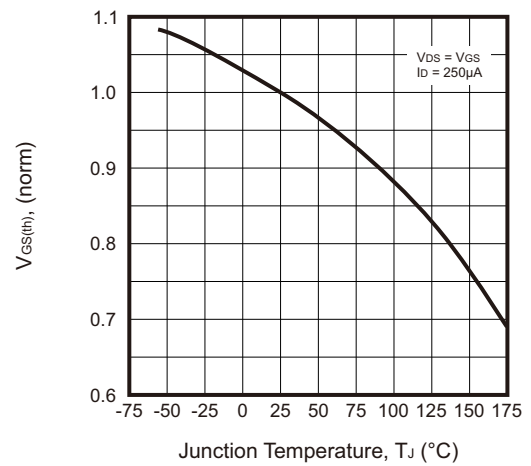
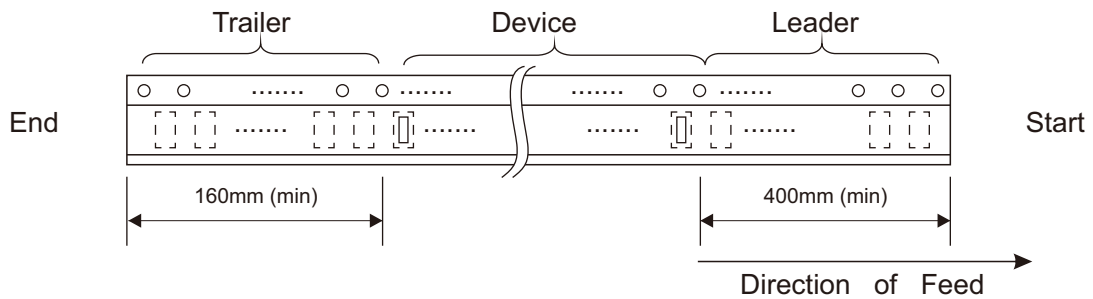
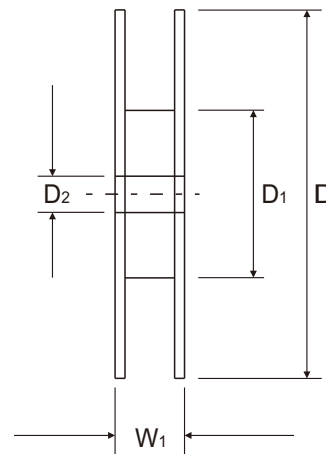
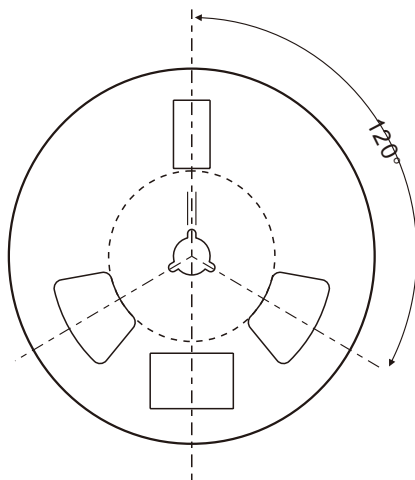
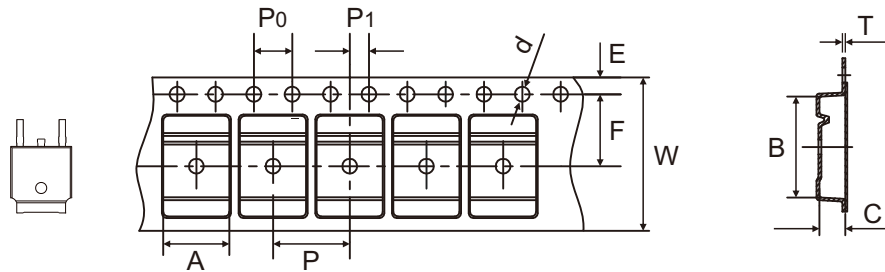


Fig.10 - $V_{GS(th)}$ vs Junction Temperature



Reel Taping Specification



TO-252	SYMBOL	A	B	C	d	D	D1	D2
	(mm)	6.90 ± 0.10	10.50 ± 0.10	2.50 ± 0.10	1.50 + 0.25 - 0.00	330 ± 2.00	100 ± 1.00	13.00 ± 1.00
	(inch)	0.272 ± 0.004	0.413 ± 0.004	0.098 ± 0.004	0.059 + 0.010 - 0.000	12.992 ± 0.079	3.937 ± 0.039	0.512 ± 0.039

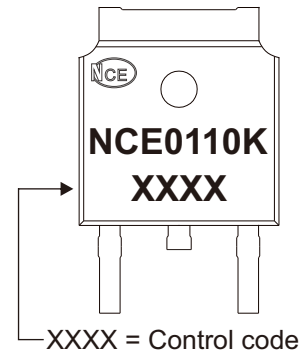
TO-252	SYMBOL	E	F	P	P0	P1	T	W	W1
	(mm)	1.75 ± 0.10	7.50 ± 0.10	8.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.10	0.30 ± 0.05	16.00 + 0.30 - 0.20	21.00 ± 1.00
	(inch)	0.069 ± 0.004	0.295 ± 0.004	0.315 ± 0.004	0.157 ± 0.004	0.079 ± 0.004	0.012 ± 0.002	0.630 + 0.012 - 0.008	0.827 ± 0.039

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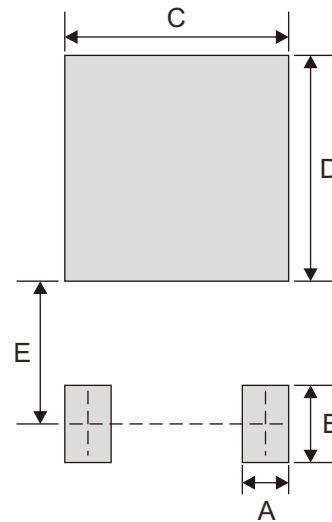
Marking Code

Part Number	Marking Code
CMS09N10D-HF	NCE0110K



Suggested P.C.B. PAD Layout

SIZE	TO-252	
	(mm)	(inch)
A	1.20	0.047
B	2.00	0.079
C	5.80	0.228
D	5.85	0.230
E	3.70	0.146



Note: 1. The pad layout is for reference purposes only.

Standard Packaging

Case Type	REEL PACK	
	REEL (pcs)	Reel Size (inch)
TO-252	2,500	13