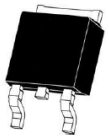
MOSFET

CMS09N10D-HF

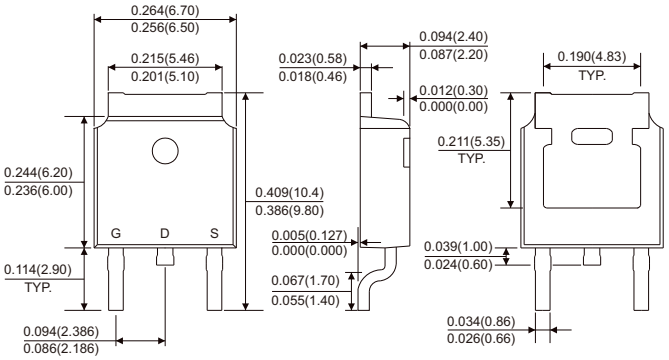
N-Channel
RoHS Device
Halogen Free



Features

- High density cell design for ultra low Rdson.
- 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.

TO-252



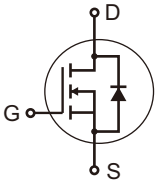
Dimensions in inches and (millimeters)

Mechanical data

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

Circuit Diagram

G : Gate
S : Source
D : Drain



Maximum Ratings (at Tc=25°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 (Tc = 100°C)	I_D (100°C)	6.5	A
Pulsed drain current	I_{DM}	38.4	A
Maximum power dissipation	P_D	30	W
Derating factor		0.2	W/°C
Single pulse avalanche energy (Note 1)	E_{AS}	20	mJ
Thermal resistance, junction-to-case (Note 2)	$R_{\theta JC}$	5	°C/W
Operating junction and storage temperature range	T_J, T_{STG}	-55 to +175	°C

Notes: 1. EAS condition: T_J=25°C, V_{DD}=50V, V_G=10V, L=0.5mH, Rg=25Ω.
2. Surface mounted on FR4 board, t ≤ 10sec.
3. Pulse width limited by maximum junction temperature.

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

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Off characteristics						
Drain-source breakdown voltage	BV_{DSS}	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 di / dt = 100A/μs (Note 1)		21		ns
Reverse recovery charge	Q_{rr}			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

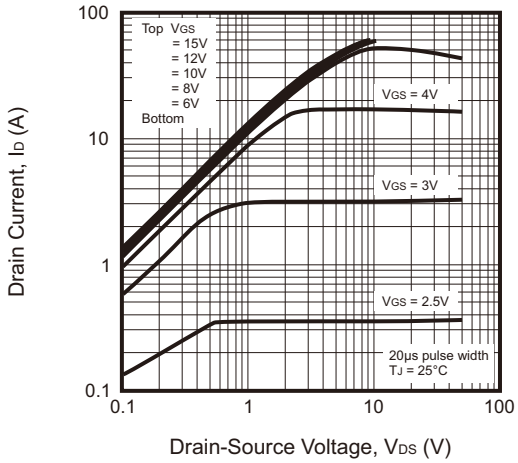


Fig.2 - $R_{DS(ON)}$-Junction Temperature

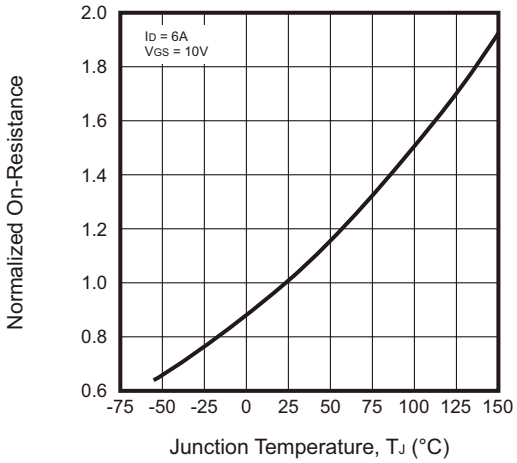


Fig.3 - Transfer Characteristics

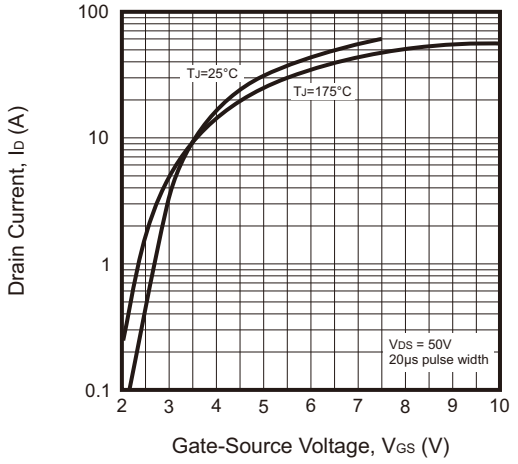


Fig.4 - Gate Charge

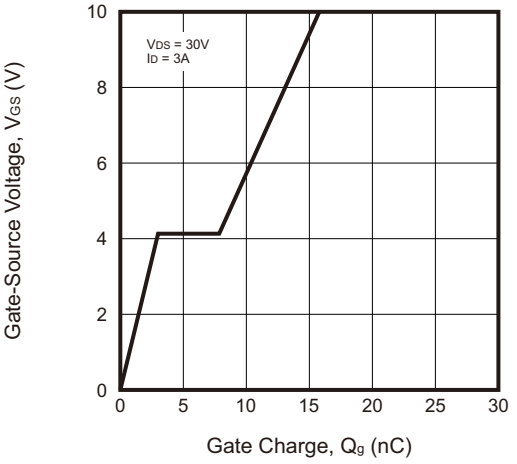


Fig.5 - $R_{DS(ON)}$-Drain Current

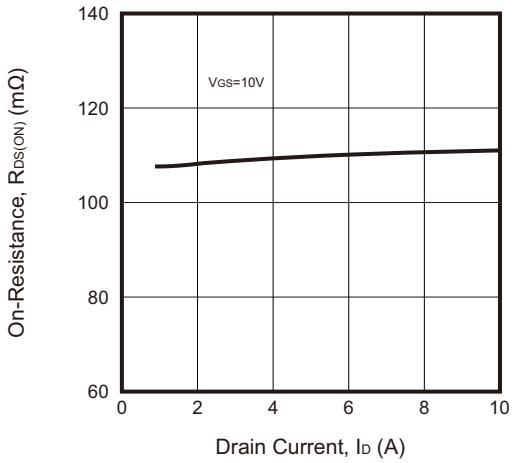
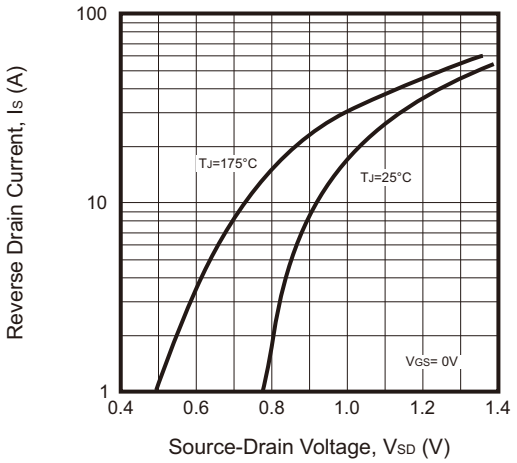


Fig.6 - Source-Drain Diode Forward



Rating and Characteristic Curves (CMS09N10D-HF)

Fig.7 - Capacitance vs V_{DS}

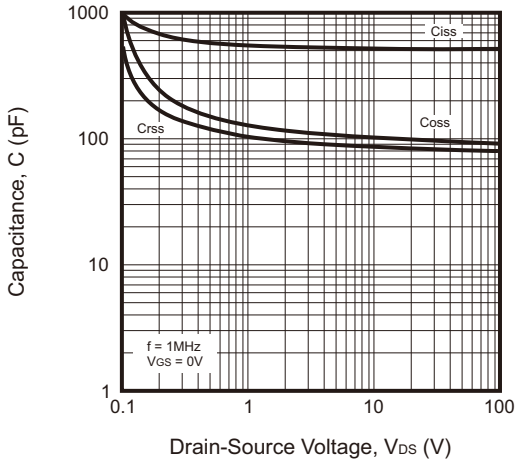


Fig.8 - BV_{DSS} vs Junction Temperature

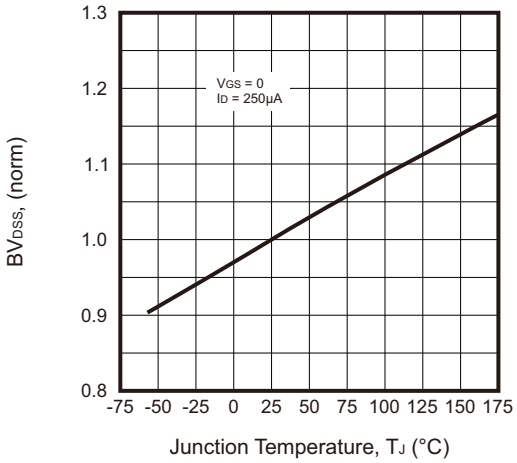


Fig.9 - Safe Operation Area

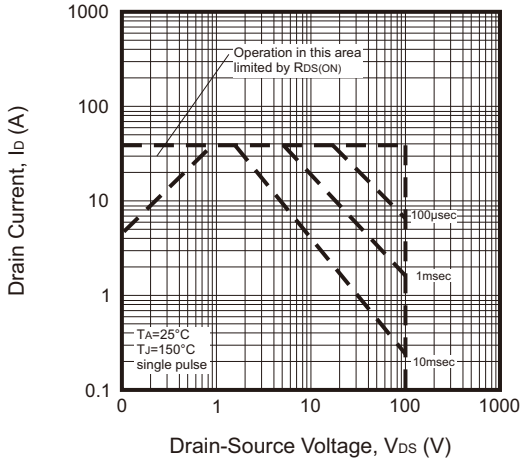
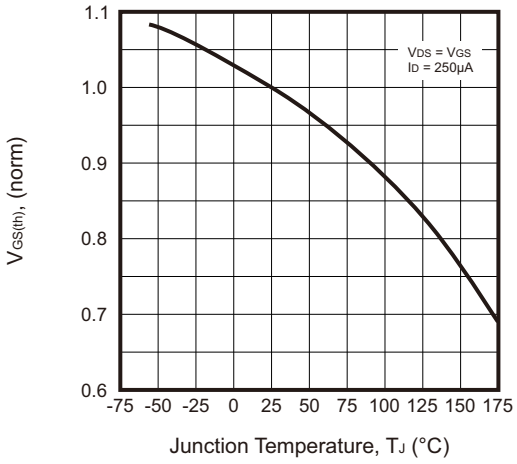
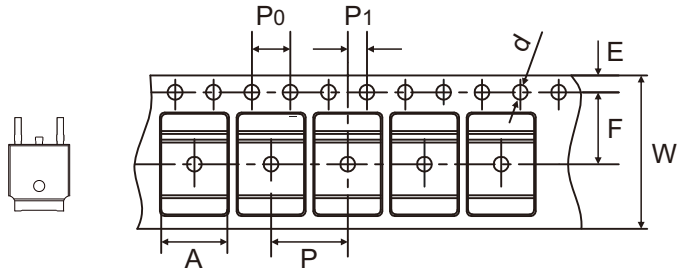
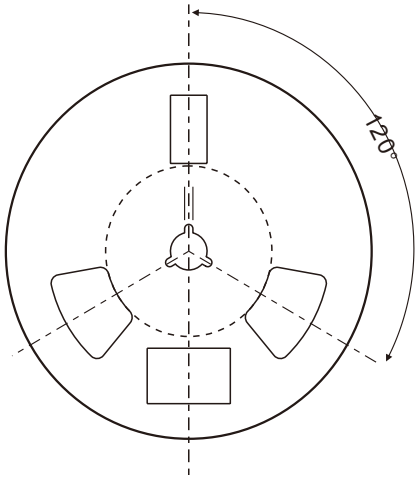


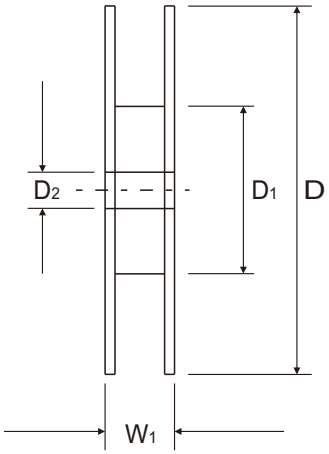
Fig.10 - $V_{GS(th)}$ vs Junction Temperature

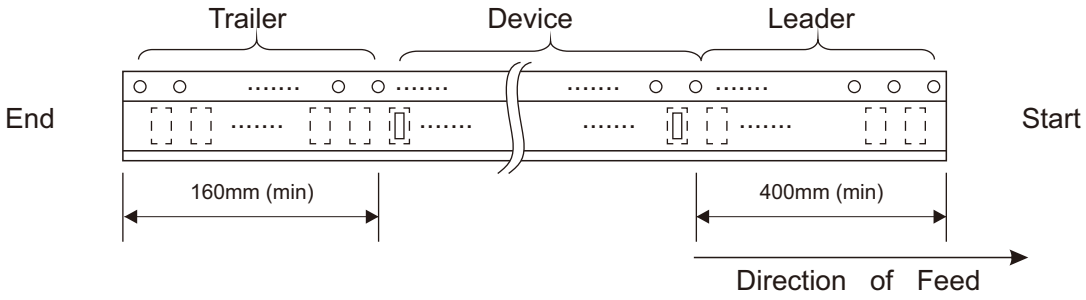


Reel Taping Specification







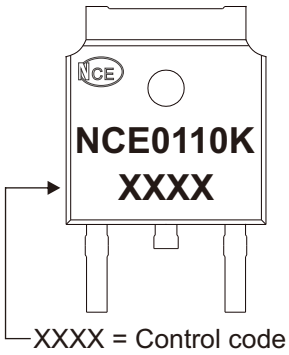


	SYMBOL	A	B	C	d	D	D1	D2
TO-252	(mm)	6.90 ± 0.10	10.50 ± 0.10	2.50 ± 0.10	1.50 + 0.25 − 0.00	330 ± 2.00	100 ± 1.00	13.00 ± 1.00
	(inch)	0.272 ± 0.004	0.413 ± 0.004	0.098 ± 0.004	0.059 + 0.010 − 0.000	12.992 ± 0.079	3.937 ± 0.039	0.512 ± 0.039

	SYMBOL	E	F	P	P0	P1	T	W	W1
TO-252	(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

Marking Code

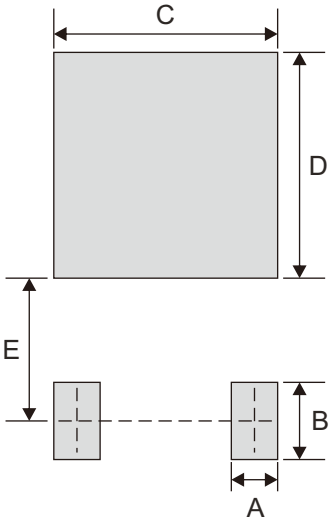
Part Number	Marking Code
CMS09N10D-HF	NCE0110K



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