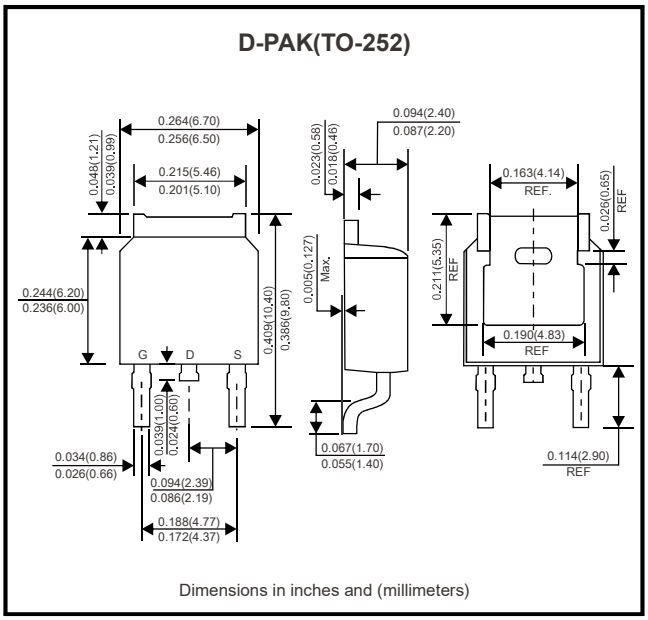
CMS23P04D-HF

P-Channel
RoHS Device
Halogen Free



Features

- Advanced high cell density Trench technology
- Excellent CdV/dt effect decline
- Green Device Available
- Super Low Gate Charge
- 100% EAS Guaranteed

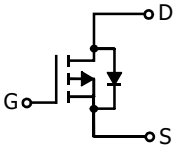
Description

The CMS23P04D is the highest performance trench P-ch MOSFETs with extreme high cell density, which provide excellent $R_{DS(ON)}$ and gate charge for most of the synchronous buck converter applications.

The CMS23P04D meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

Circuit diagram

- G : Gate
- D : Drain
- S : Source



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

Parameter	Symbol	Ratings	Unit
Drain-Source Voltage	V_{DS}	-40	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current[1]	I_D @Tc=25℃	-23	A
	I_D @Tc=100℃	-18	A
Pulsed Drain Current[2]	I_{DM}	-46	A
Total Power Dissipation[4]	P_D @Tc=25℃	31.3	W
	P_D @T_A=25℃	2	W
Single Pulse Avalanche Energy, L=0.1mH[3]	E_{AS}	37	mJ
Single Pulse Avalanche Current, L=0.1mH[3]	I_{AS}	-27.2	A
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 ~ +150	℃

Thermal Data

Parameter	Symbol	Conditions	Max. Value	Unit
Thermal Resistance Junction-ambient[1]	$R_{\theta JA}$	Steady State	62	℃/W
Thermal Resistance Junction-case[1]	$R_{\theta JC}$	Steady State	4	℃/W

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Drain-Source Breakdown Voltage	BV_{DSS}	-40	-	-	V	V_{GS}=0, I_D=-250Ua
Breakdown Voltage Temperature Coefficient	$\triangle BV_{DSS}/\triangle T_J$	-	-0.012	-	V/℃	Reference to 25℃, I_D=-1mA
Gate Threshold Voltage	$V_{GS(th)}$	-1.0	-	-2.5	V	V_{DS}=V_{GS}, I_D=-250uA
Forward Transconductance	g_{fs}	-	12.6	-	S	V_{DS}=-5V, I_D=-18A
Gate-Source Leakage Current	I_{GSS}	-	-	±100	nA	V_{GS}= ±20V
Drain-Source Leakage Current(T_J=25℃)	I_{DSS}	-	-	-1	uA	V_{DS}=-32V, V_{GS}=0
Drain-Source Leakage Current(T_J=55℃)		-	-	-5		V_{DS}=-32V, V_{GS}=0
Static Drain-Source On-Resistance[2]	$R_{DS(ON)}$	-	32	40	mΩ	V_{GS}=-10V, I_D=-18A
		-	52	65		V_{GS}=-4.5V, I_D=-12A
Total Gate Charge[2]	Q_g	-	9	-	nC	I_D=-12A V_{DS}=-20V V_{GS}=-4.5V
Gate-Source Charge	Q_{gs}	-	2.54	-		
Gate-Drain (“Miller”) Change	Q_{gd}	-	3.1	-		
Turn-on Delay Time[2]	$T_{d(on)}$	-	19.2	-	ns	V_{DD}=-15V I_D=-1A V_{GS}=-10V R_G=3.3Ω
Rise Time	T_r	-	12.8	-		
Turn-off Delay Time	$T_{d(off)}$	-	48.6	-		
Fall Time	T_f	-	4.6	-		
Input Capacitance	C_{iss}	-	1004	-	pF	V_{GS}=0V V_{DS}=-15 V f=1.0MHz
Output Capacitance	C_{oss}	-	108	-		
Reverse Transfer Capacitance	C_{rss}	-	80	-		

Guaranteed Avalanche Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Single Pulse Avalanche Energy[5]	EAS	11.25	-	-	mJ	V_{DD}=-25V, L=0.1mH, I_{AS}=-15A

Source-Drain Diode

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Diode Forward Voltage[2]	V_{SD}	-	-	-1.2	V	I_S=-23A, V_{GS}=0V, T_J=25℃
Continuous Source Current[1,6]	I_S	-	-	-23	A	V_G=V_D=0V, Force Current
Pulsed Source Current[2,6]	I_{SM}	-	-	-46	A	

Notes: 1. Surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.

2. The data tested by pulsed, pulse width ≦ 300us, duty cycle ≦ 2%.

3. The EAS data shows Max. rating. The test condition is VDD=-25V, VGS=-10V, L=0.1mH, IAS=-27.2A.

4. The power dissipation is limited by 150℃ junction temperature.

5. The Min. value is 100% EAS tested guarantee.

6. The data is theoretically the same as ID and IDM, in real applications, should be limited by total power dissipation.

RATING AND CHARACTERISTIC CURVES

Typical Characteristics

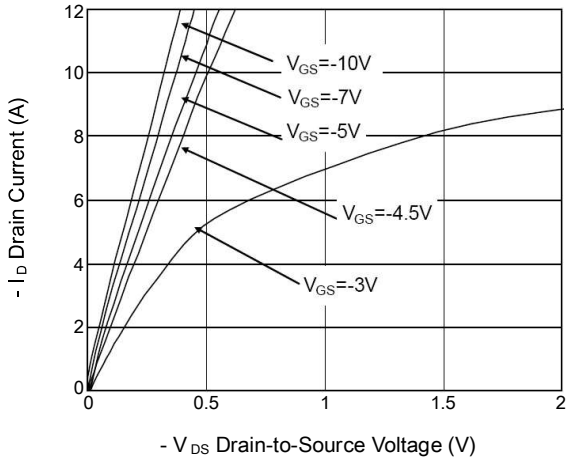


Fig.1 Typical Output Characteristics

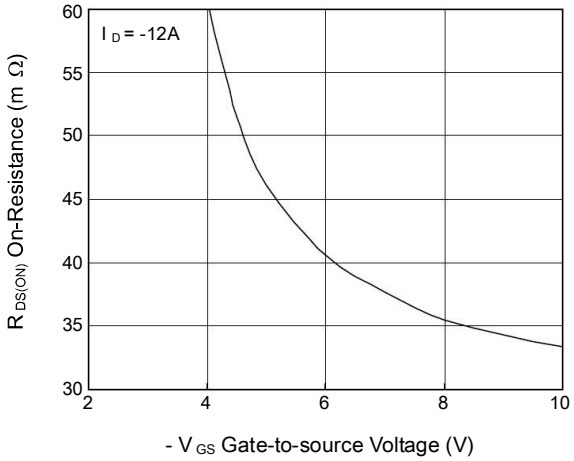


Fig.2 On-Resistance vs. G-S Voltage

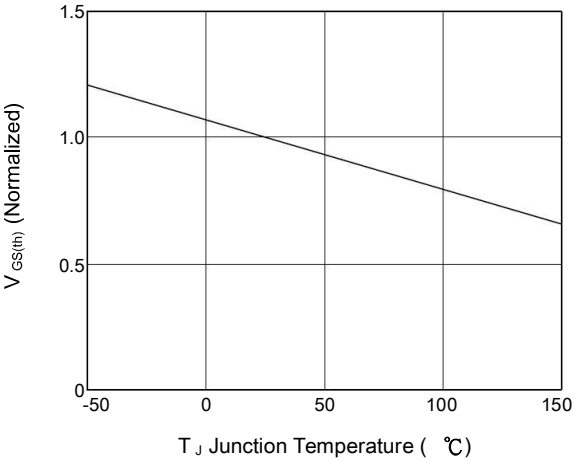


Fig.3 Normalized V GS(th) vs. T J

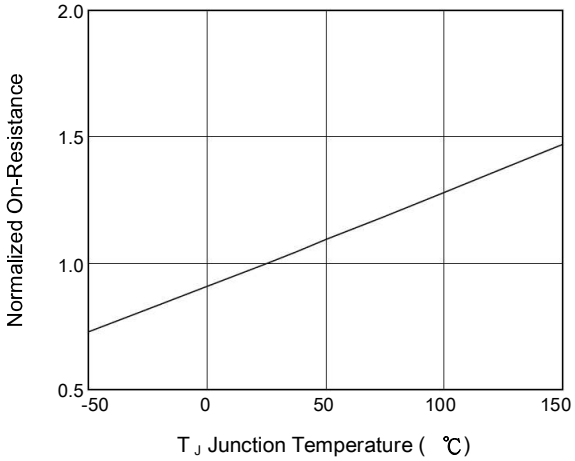


Fig.4 Normalized R DSON vs. T J

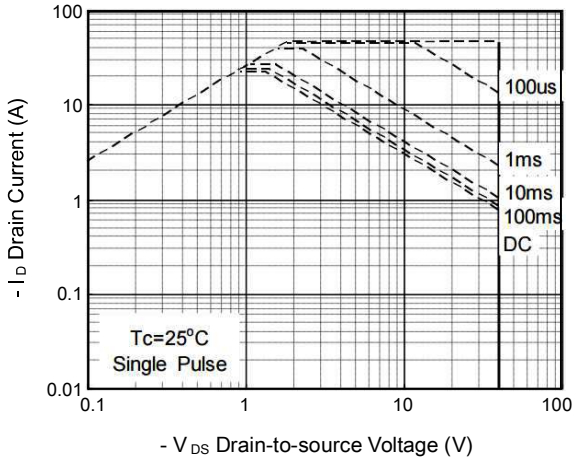


Fig.5 Safe Operating Area

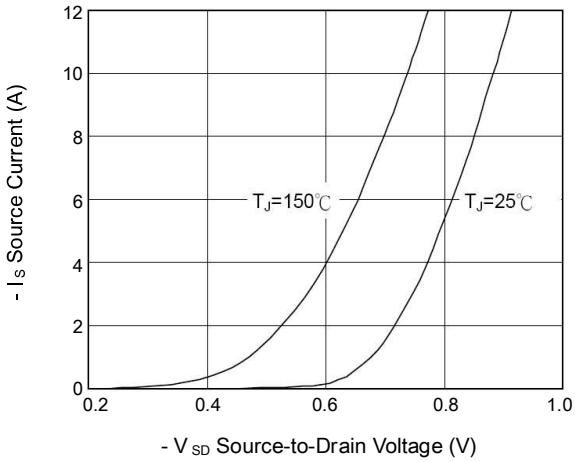


Fig.6 Forward Characteristics of Reverse

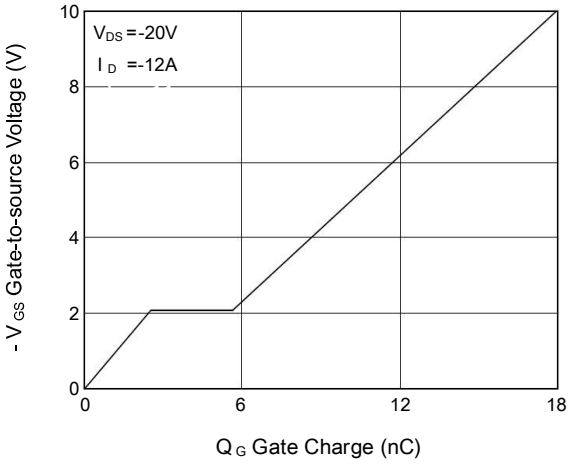


Fig.7 Gate Charge Characteristics

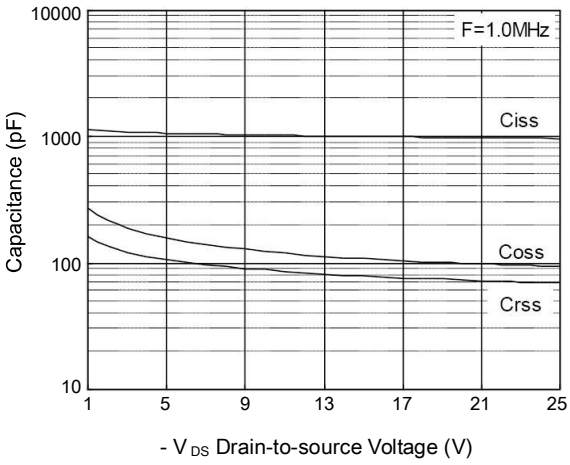


Fig.8 Capacitance Characteristics

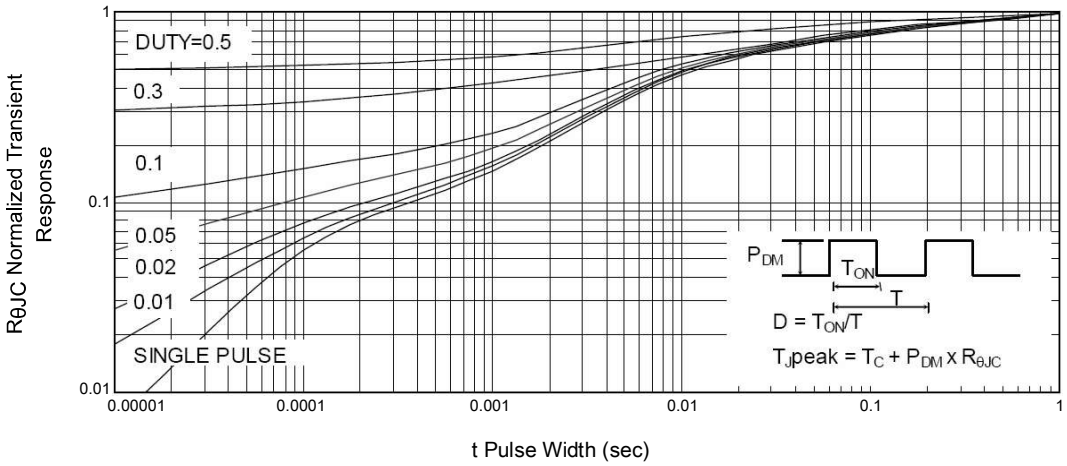


Fig.9 Normalized Maximum Transient Thermal Impedanc e

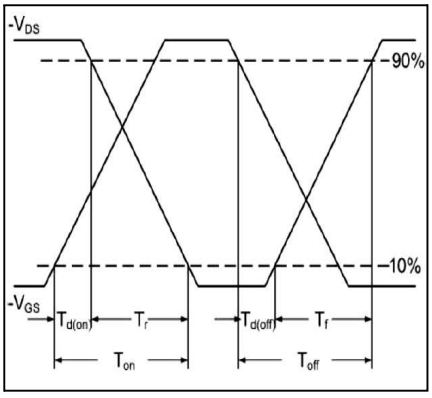


Fig.10 Switching Time Waveform

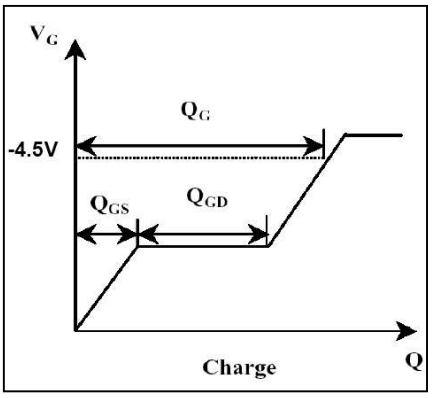
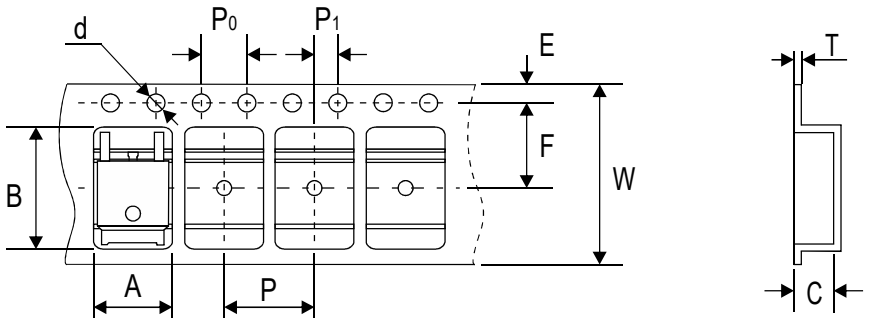
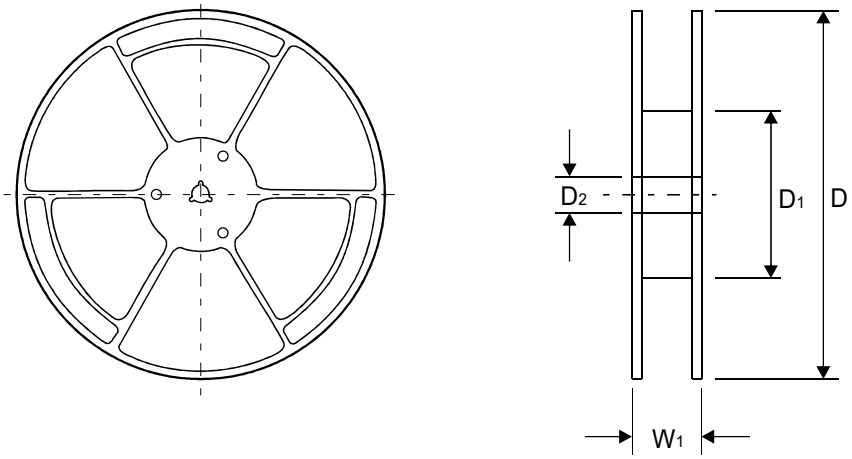
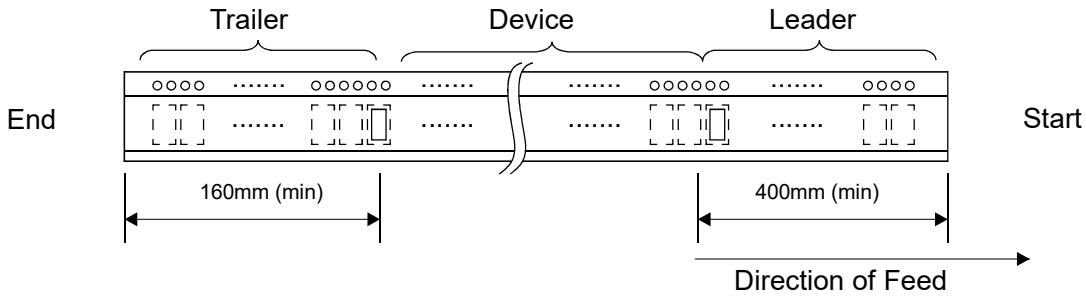


Fig.11 Gate Charge Waveform

Reel Taping Specification





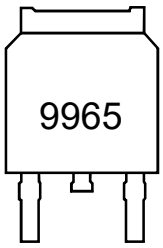


	SYMBOL	A	B	C	d	D	D1	D2
TO-252 (D-PAK)	(mm)	6.90 ± 0.10	10.50 ± 0.10	2.70 ± 0.10	1.55 ± 0.05	330.00 ± 2.00	100.00 ± 1.00	13.00 ± 1.00
	(inch)	0.272 ± 0.004	0.413 ± 0.004	0.106 ± 0.004	0.061 ± 0.002	12.992 ± 0.079	3.937 ± 0.039	0.512 ± 0.039

	SYMBOL	E	F	P	P0	P1	T	W	W1
TO-252 (D-PAK)	(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 ± 0.10	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 ± 0.004	0.827 ± 0.039

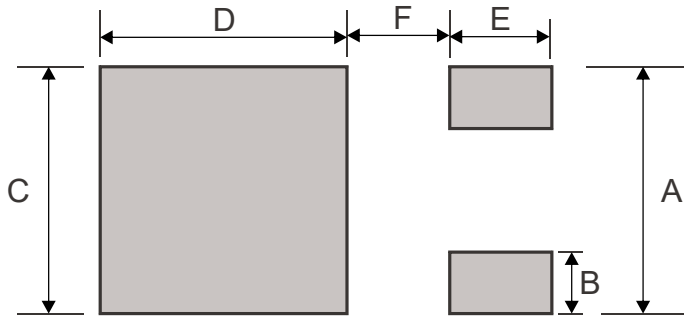
Marking Code

Part Number	Marking Code
CMS23P04D-HF	9965



Suggested PAD Layout

SIZE	TO-252 / DPAK	
	(mm)	(inch)
A	6.17	0.243
B	1.60	0.063
C	5.80	0.228
D	6.20	0.244
E	3.00	0.118
F	2.58	0.101



Standard Packaging

Case Type	REEL PACK	
	REEL (pcs)	REEL SIZE (inch)
TO-252/D-PAK	2,500	13