CMD5N50/CMU5N50

July 2011

General Description

These N-Channel enhancement mode power field effect transistors are produced using advanced technology which has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switch mode power supplies, power factor correction and electronic lamp ballasts based on half bridge.

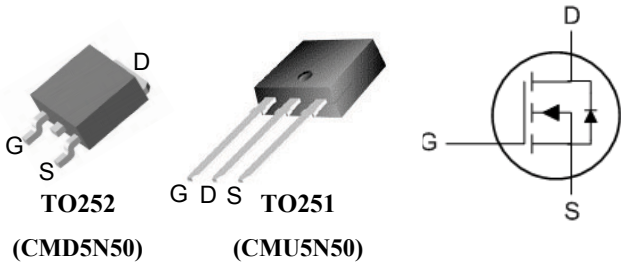
Product Summery

BVDSS	RDSON	ID
500V	1.5 Ω	4.5A

Features

- Low gate charge (typical 27 nC)
- Low Crss (typical 17 pF)
- Fast switching
- 100%avalanche tested
- Improved dv/dt capability

TO252 / TO251 Pin Configuration



Absolute Maximum Ratings

T_C = 25°C unless otherwise noted

Symbol	Parameter		CMD5N50/CMU5N50	Units
V_{DSS}	Drain-Source Voltage		500	V
I_D	Drain Current - Continuous (T_C = 25°C)		4.5	A
	- Continuous (T_C = 100°C)		2.9	A
I_{DM}	Drain Current - Pulsed	(Note 1)	15	A
V_{GSS}	Gate-Source Voltage		±30	V
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	500	mJ
I_{AR}	Avalanche Current	(Note 1)	4.5	A
E_{AR}	Repetitive Avalanche Energy	(Note 1)	7.3	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	5.5	V/ns
P_D	Power Dissipation (T_C = 25°C)		50	W
	- Derate above 25°C		0.58	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	°C
T_L	Maximum lead temperature for soldering purposes, 1/8 from case for 5 seconds		300	°C

* Drain current limited by maximum junction temperature

Thermal Characteristics

Symbol	Parameter	CMD5N50/CMU5N50	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case Max.	1.71	°C/W
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink Typ.	0.5	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient Max.	62.5	°C/W

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Electrical Characteristic

T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 A	500	--	--	V
BV_{DSS} / T_J	Breakdown Voltage Temperature Coefficient	I_D = 250 A, Referenced to 25°C	--	0.54	--	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 500 V, V_{GS} = 0 V	--	--	1	A
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 30 V, V_{DS} = 0 V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -30 V, V_{DS} = 0 V	--	--	-100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 A	2.0	--	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 2.5A	--	--	1.5	Ω
g_{FS}	Forward Transconductance	V_{DS} = 40 V, I_D = 2.25 A (Note 4)	--	4.2	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	800	1050	pF
C_{oss}	Output Capacitance		--	76	100	pF
C_{rss}	Reverse Transfer Capacitance		--	17	22	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 250 V, I_D = 4.5 A, R_G = 25Ω (Note 4, 5)	--	15	40	ns
t_r	Turn-On Rise Time		--	40	90	ns
$t_{d(off)}$	Turn-Off Delay Time		--	85	180	ns
t_f	Turn-Off Fall Time		--	45	100	ns
Q_g	Total Gate Charge	V_{DS} = 400 V, I_D = 4.5 A, V_{GS} = 10 V (Note 4, 5)	--	27	35	nC
Q_{gs}	Gate-Source Charge		--	4.0	--	nC
Q_{gd}	Gate-Drain Charge		--	12	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	4.5	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	15	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 4.5 A	--	--	1.4	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_S = 4.5 A, dI_F / dt = 100 A/ s (Note 4)	--	305	--	ns
Q_{rr}	Reverse Recovery Charge		--	2.6	--	C

Notes:
1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 24mH, I_{AS} = 4.5A, V_{DD} = 50V, R_G = 25Ω , Starting T_J = 25°C
3. I_{SD} ≤ 4.5A , di/dt ≤ 300A/ s, V_{DD} ≤ $BV_{DSS,}$ Starting T_J = 25°C
4. Pulse Test : Pulse width ≤ 300 s, Duty cycle ≤ 2%
5. Essentially independent of operating temperature