

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.

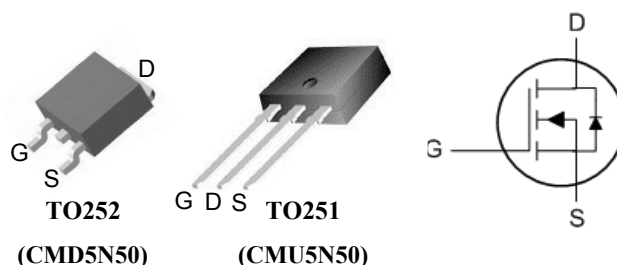
Features

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

Product Summary

BVDSS	RDSON	ID
500V	1.5 Ω	4.5A

TO252 / TO251 Pin Configuration



Absolute Maximum Ratings

$T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	CMD5N50/CMU5N50	Units
V_{DSS}	Drain-Source Voltage	500	V
I_D	Drain Current - Continuous ($T_C = 25^\circ\text{C}$)	4.5	A
	- Continuous ($T_C = 100^\circ\text{C}$)	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 ($T_C = 25^\circ\text{C}$)	50	W
	- Derate above 25°C	0.58	W/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ\text{C}$
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	$^\circ\text{C}$

* 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	$^\circ\text{C/W}$
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink Typ.	0.5	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient Max.	62.5	$^\circ\text{C/W}$

Electrical Characteristic

$T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ A}$	500	--	--	V
BV_{DSS} / T_J	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ A}$, Referenced to 25°C	--	0.54	--	$V/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 500\text{ V}, V_{GS} = 0\text{ V}$	--	--	1	A
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = 30\text{ V}, V_{DS} = 0\text{ V}$	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -30\text{ V}, V_{DS} = 0\text{ V}$	--	--	-100	nA

On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\text{ A}$	2.0	--	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 2.5\text{ A}$	--	--	1.5	Ω
g_{FS}	Forward Transconductance	$V_{DS} = 40\text{ V}, I_D = 2.25\text{ A}$ (Note 4)	--	4.2	--	S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	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	$V_{DD} = 250\text{ V}, I_D = 4.5\text{ A},$ $R_G = 25\Omega$ (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	$V_{DS} = 400\text{ V}, I_D = 4.5\text{ A},$ $V_{GS} = 10\text{ V}$ (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,	(Note 4)	--	305	--	ns
Q _{rr}	Reverse Recovery Charge	dI _F / dt = 100 A/ s		--	2.6	--	C

Notes:

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