

MOSFET Silicon N-Channel MOS

1 Description

Features

- Ultra-fast body diode
- Low drain-source on-resistance: $R_{DS(ON)} = 0.101\Omega$ (typ.)
- Easy to drive
- Pb-free plating, Halogen free mold compound and meet RoHS requirement

Applications

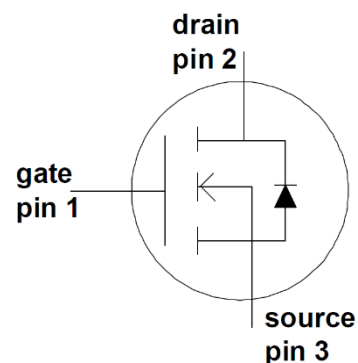
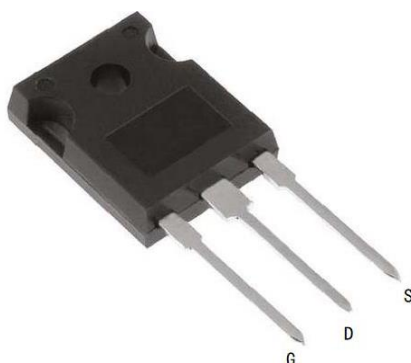
- For Soft Switching Boost PFC switch, HB or AHB or LLC half bridge and full bridge topologies.
- Such as phase-shift-bridge(ZVS),LLC Application-Server Power, Telecom Power, EV Charging, Solar inverter.

Table 1 Key Performance Parameters

Parameter	Value	Unit
VDS @ Tj,max	650	V
RDS(on),max	110	mΩ
Qg,typ	53	nC
ID,pulse	90	A
Body diode dv/dt	50	V/ns

Packaging and Internal Circuit

Part Name	Package	Marking	Packing Method	QTY/BOX
CMW60R110DFD	TO-247	CMW60R110DFD	Tube	1200PCS



2 Maximum ratings

at $T_j = 25^\circ\text{C}$, unless otherwise specified

Table 2 Maximum ratings

Parameter	Symbol	Value			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Continuous drain current ¹⁾	I_D		-	30	A	$T_C=25^\circ\text{C}$
Pulsed drain current ²⁾	$I_{D,pulse}$	-	-	90	A	$T_C=25^\circ\text{C}$
Avalanche energy, single pulse	E_{AS}	-	-	560	mJ	$T_C=25^\circ\text{C}, V_{DD}=50\text{V}, L=70\text{mH}, R_G=25\Omega$
Avalanche current, single pulse	I_{AR}	-	-	4	A	$T_C=25^\circ\text{C}, V_{DD}=50\text{V}, L=70\text{mH}, R_G=25\Omega$
MOSFET dv/dt ruggedness	dv/dt	-	-	50	V/ns	$V_{DS}=0\dots400\text{V}$
Gate source voltage (static)	V_{GS}	-20	-	20	V	static;
Gate source voltage (dynamic)	V_{GS}	-30	-	30	V	AC ($f>1\text{ Hz}$)
Power dissipation	P_{tot}	-	-	260	W	$T_C=25^\circ\text{C}$
Storage temperature	T_{stg}	-55	-	150	$^\circ\text{C}$	
Operating junction temperature	T_j	-55	-	150	$^\circ\text{C}$	
Reverse diode dv/dt ³⁾	dv/dt	-	-	50	V/ns	$V_{DS}=0\dots400\text{V}, I_{SD}\leq 30\text{A}, T_j=25^\circ\text{C}$

¹⁾ Limited by $T_{j,max}$. Maximum Duty Cycle $D = 0.5$

²⁾ Pulse width t_p limited by $T_{j,max}$

³⁾ Identical low side and high side switch with identical R_G

3 Thermal characteristics

Table 3 Thermal characteristics

Parameter	Symbol	Value			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction-case	R_{thJC}	-	-	0.48	°C/W	-
Thermal resistance, junction-ambient	R_{thJA}	-	-	62	°C/W	device on PCB, minimal footprint

4 Electrical characteristics

 at $T_j=25^{\circ}\text{C}$, unless otherwise specified

Table 4 Static characteristics

Parameter	Symbol	Value			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	600	-	-	V	$V_{GS}=0V, I_D=1mA$
Gate threshold voltage	$V_{(GS)th}$	3		5	V	$V_{DS}=V_{GS}, I_D=2mA$
Zero gate voltage drain current	I_{DSS}	-	-	5	μA	$V_{DS}=600V, V_{GS}=0V, T_j=25^{\circ}\text{C}$
Gate-source leakage current	I_{GSS}	-	-	100	nA	$V_{GS}=30V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	0.101	0.110	Ω	$V_{GS}=10V, I_D=12.7A, T_j=25^{\circ}\text{C}$
Gate resistance (Intrinsic)	R_G	-	1.1	-	Ω	$f=100kHz, \text{open drain}$

Table 5 Dynamic characteristics

Parameter	Symbol	Value			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	2500	-	pF	$V_{GS}=0V, V_{DS}=100V, f=100kHz$
Output capacitance	C_{oss}	-	95	-	pF	
Reverse transfer capacitance	C_{rss}	-	2.8	-	pF	
Turn-on delay time	$t_d(on)$	-	50	-	ns	$V_{DD}=400V, V_{GS}=13V, I_D=20A, R_G=15\Omega; \text{see table 11}$
Rise time	t_r	-	115	-	ns	
Turn-off delay time	$t_d(off)$	-	98	-	ns	
Fall time	t_f	-	12.9	-	ns	

Table 6 Gate charge characteristics

Parameter	Symbol	Value			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	19	-	nC	$V_{DD}=400V, I_D=20A, V_{GS}=10V$
Gate to drain charge	Q_{gd}	-	21	-	nC	
Gate charge total	Q_g	-	53	-	nC	
Gate plateau voltage	$V_{plateau}$	-	7.5	-	V	

Table 7 Reverse diode characteristics

Parameter	Symbol	Value			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode forward voltage	V_{SD}	-	0.93	-	V	$V_{GS}=0V, I_F=20A, T_j=25^\circ C$
Reverse recovery time	t_{rr}	-	132	-	ns	$V_r=400v, I_F=20A, di/dt=100A/us$ see table 10
Reverse recovery charge	Q_{rr}	-	0.59	-	uC	
Peak reverse recovery current	I_{rrm}	-	9	-	A	

5 Electrical characteristics diagram
Table 8

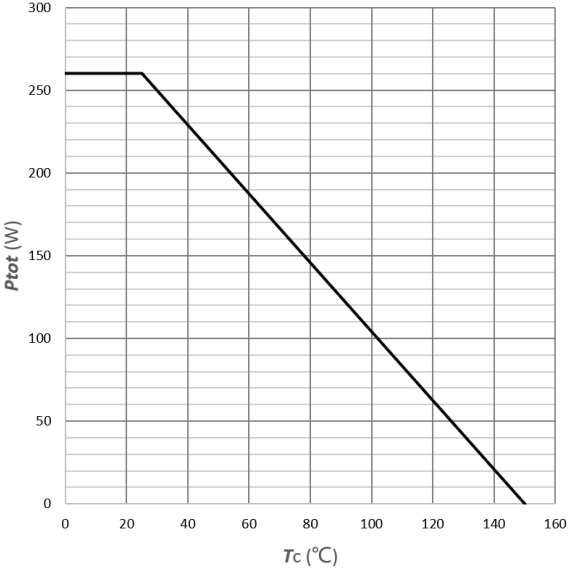
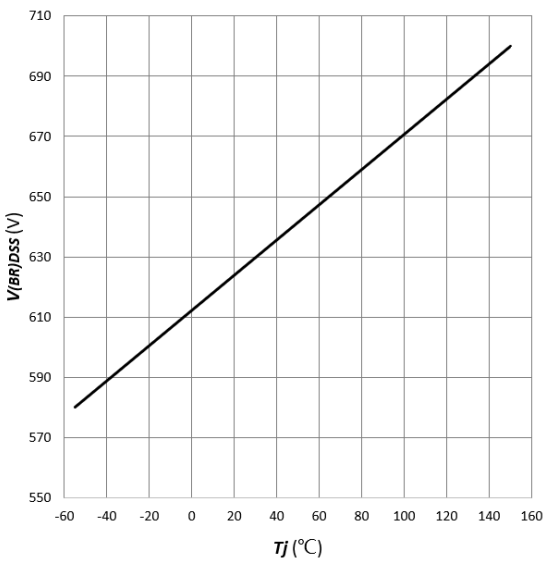
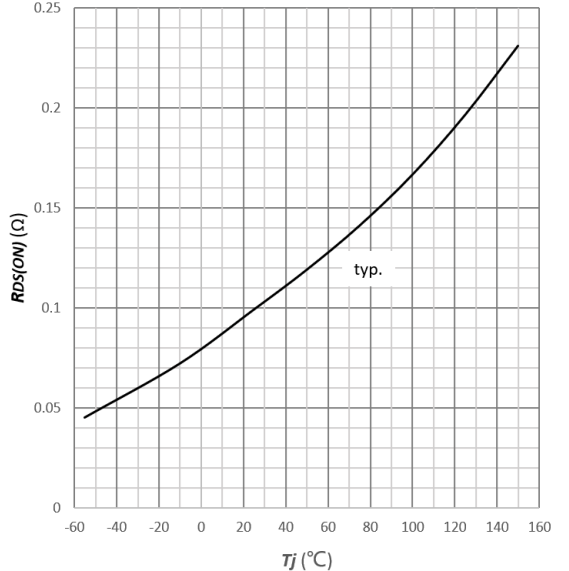
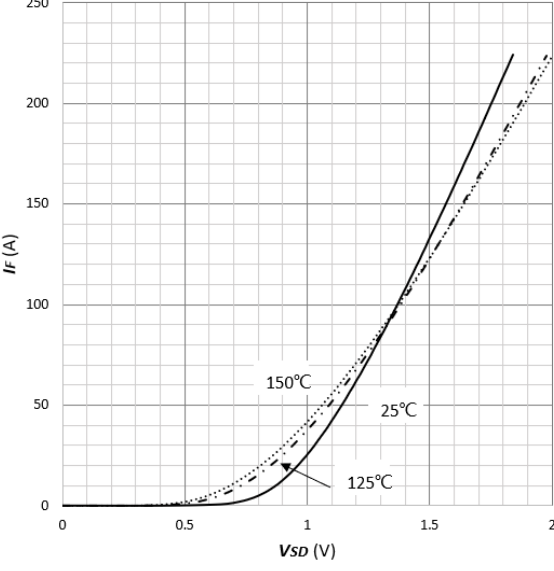
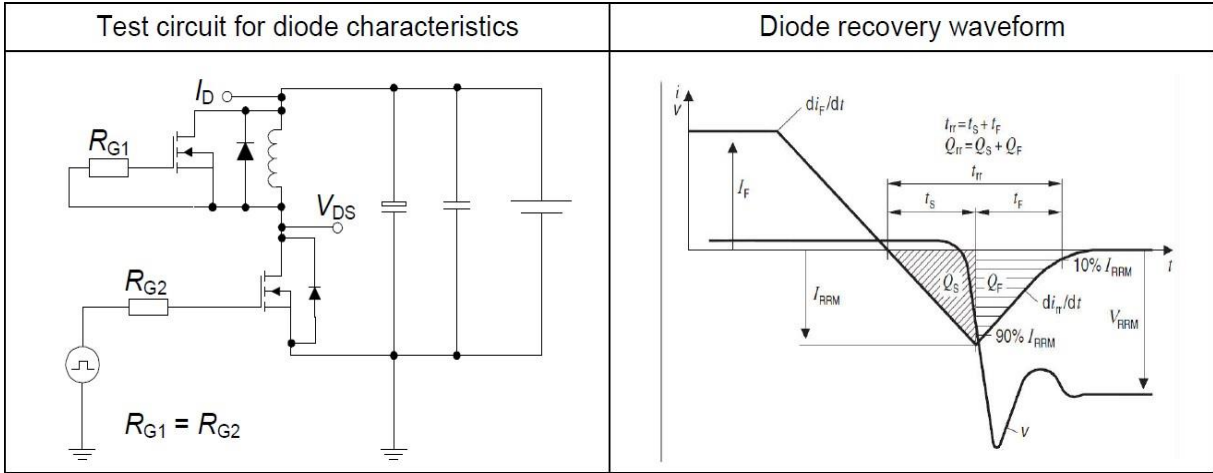
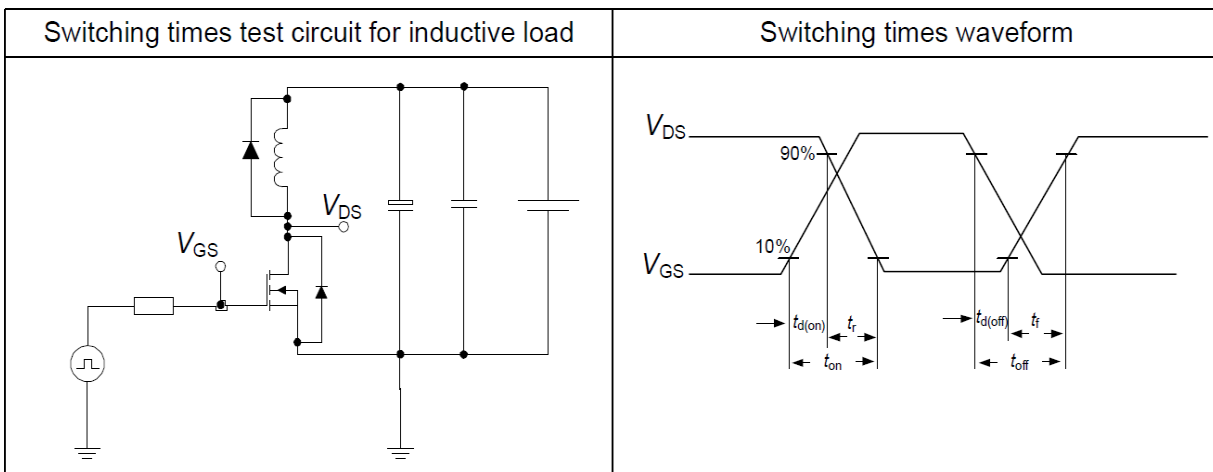
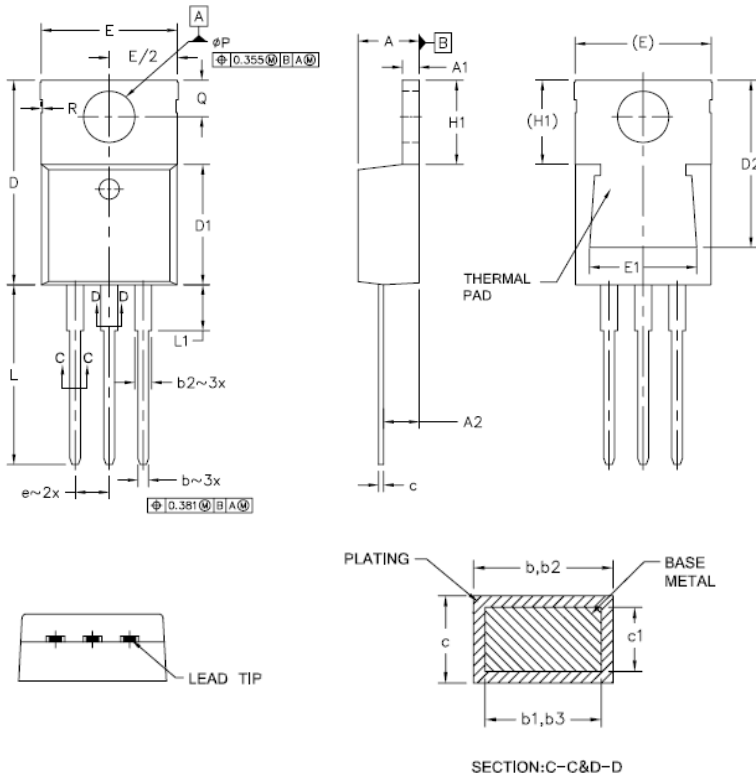
Power dissipation	Drain-source breakdown voltage
	
$P_{tot} = f(T_c)$	$V_{BR(DSS)} = f(T_j); I_D = 10 \text{ mA}$

Table 9

Drain-source on-state resistance	Forward characteristics of reverse diode
	
$R_{DS(on)} = f(T_j); I_D = 12.7 \text{ A}; V_{GS} = 10 \text{ V}$	$I_F = f(V_{SD}); \text{parameter: } T_j$

6 Test Circuits
Table 10 Diode characteristics

Table 11 Switching times


7 Package Outlines
Figure1: Outline of PG-TO220


SYMBOLS	COMMON			
	MM		INCH	
	MIN.	MAX.	MIN.	MAX.
A	3.556	4.826	0.140	0.190
A1	0.508	1.397	0.020	0.055
A2	2.032	2.921	0.080	0.115
b	0.381	1.016	0.015	0.040
b1	0.381	0.965	0.015	0.038
b2	1.143	1.778	0.045	0.070
b3	1.143	1.727	0.045	0.070
c	0.356	0.610	0.014	0.024
c1	0.356	0.559	0.014	0.022
D	14.224	16.510	0.560	0.650
D1	8.382	9.017	0.330	0.355
D2	12.192	12.878	0.480	0.507
E	9.652	10.668	0.380	0.420
E1	6.858	8.890	0.270	0.350
e	2.540 BSC.		0.100 BSC.	
H1	5.842	6.858	0.230	0.270
L	12.700	14.732	0.500	0.580
L1	—	6.350	—	0.250
ϕP	3.810	3.860	0.150	0.151
Q	2.540	3.048	0.100	0.120
R	0.127 BSC		0.005 BSC	

8 Product Code

Figure2: Product number Decode

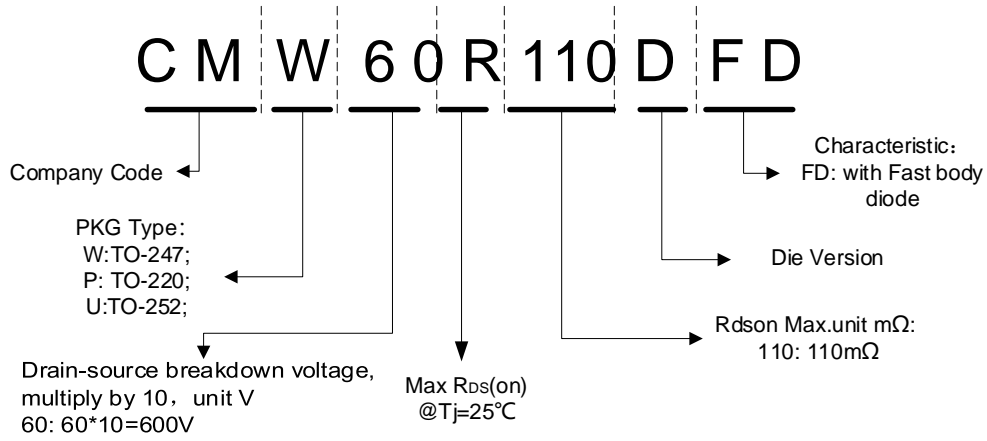
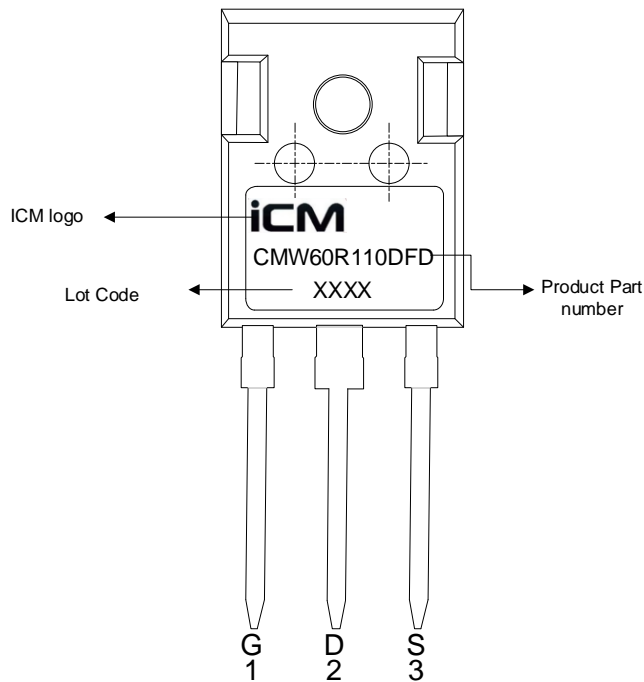


Figure3: Part Marking Information



Revision History

Revision	Date	Subjects (major changes since last revision)
Rev1.0	2022-01-10	Preliminary version