

MOSFET Silicon N-Channel MOS

1 Description

Features

- Ultra-fast body diode
- Low drain-source on-resistance: $R_{DS(ON)} = 0.026\Omega$ (typ.)
- Easy to drive
- Pb-free plating, Halogen free mold compound and meet RoHS requirement

Applications

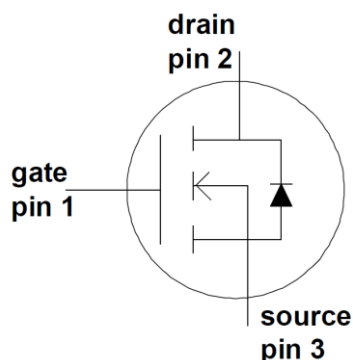
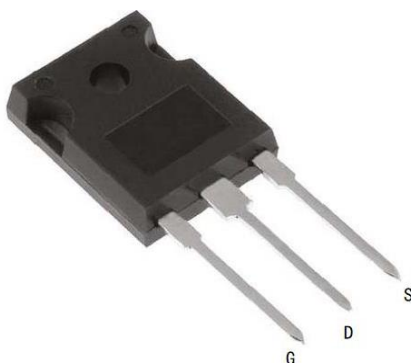
- For Soft Switching Boost PFC switch, HB or AHB or LLC half bridge and full bridge topologies.
- Such as phase-shift-bridge(ZVS),LLC Application-Server Power, Telecom Power, EV Charging, Solar inverter.

Table 1 Key Performance Parameters

Parameter	Value	Unit
$V_{DS} @ T_{j,max}$	650	V
$R_{DS(on),max}$	30	m Ω
Q_g,typ	150	nC
$I_D,pulse$	240	A
Body diode dv/dt	50	V/ns

Packaging and Internal Circuit

Part Name	Package	Marking	Packing Method	QTY/BOX
CMW60R030DFD	TO-247	CMW60R030DFD	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		-	80	A	$T_C=25^{\circ}\text{C}$
				50		$T_C=100^{\circ}\text{C}$
Pulsed drain current ²⁾	$I_{D,pulse}$	-	-	240	A	$T_C=25^{\circ}\text{C}$
Avalanche energy, single pulse	E_{AS}	-	-	400	mJ	$T_C=25^{\circ}\text{C}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$
Avalanche current, single pulse	I_{AR}	-	-	9	A	$T_C=25^{\circ}\text{C}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$
MOSFET dv/dt ruggedness	dv/dt	-	-	50	V/ns	$V_{DS}=0\ldots 400\text{V}$
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}	-	-	390	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	$V_{DS}=0\ldots 400\text{V}$, $I_{SD}\leq 40\text{A}$, $T_j=25^{\circ}\text{C}$ see table 14

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}	-	-	0.32	°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	$V_{DS}=650V, V_{GS}=0V, T_j=25^{\circ}\text{C}$
Gate-source leakage current	I_{GSS}	-	-	100	nA	$V_{GS}=30V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	0.026	0.030	Ω	$V_{GS}=10V, I_D=40A, T_j=25^{\circ}\text{C}$
Gate resistance (Intrinsic)	R_G	-	3.3	-	Ω	$f=100kHz$, open drain

Table 5 Dynamic characteristics

Parameter	Symbol	Value			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	7330	-	pF	$V_{GS}=0V, V_{DS}=100V, f=100kHz$
Output capacitance	C_{oss}	-	167	-	pF	$V_{GS}=0V, V_{DS}=100V, f=100kHz$
Reverse transfer capacitance	C_{rss}	-	2.5	-	pF	$V_{GS}=0V, V_{DS}=100V, f=100kHz$
Turn-on delay time	$t_{d(on)}$	-	33	-	ns	$V_{DD}=400V, V_{GS}=13V, I_D=40A$ $R_G=12.7\Omega$; see table 15
Rise time	t_r	-	55	-	ns	
Turn-off delay time	$t_{d(off)}$	-	147	-	ns	
Fall time	t_f	-	13	-	ns	

Table 6 Gate charge characteristics

Parameter	Symbol	Value			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	38	-	nC	$V_{DD}=400V, I_D=40A, V_{GS}=10V$
Gate to drain charge	Q_{gd}	-	54	-	nC	
Gate charge total	Q_g	-	150	-	nC	
Gate plateau voltage	$V_{plateau}$	-	6	-	V	

Table 7 Reverse diode characteristics

Parameter	Symbol	Value			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode forward voltage	V_{SD}	-	1	-	V	$V_{GS}=0V, I_F=40A, T_J=25^{\circ}C$
Reverse recovery time	t_{rr}	-	175	-	ns	$V_r=400V, I_F=40A, di/dt=100A/\mu s$ see table 14
Reverse recovery charge	Q_{rr}	-	1.58	-	uC	
Peak reverse recovery current	I_{rrm}	-	15	-	A	

5 Electrical characteristics diagram

Table 8

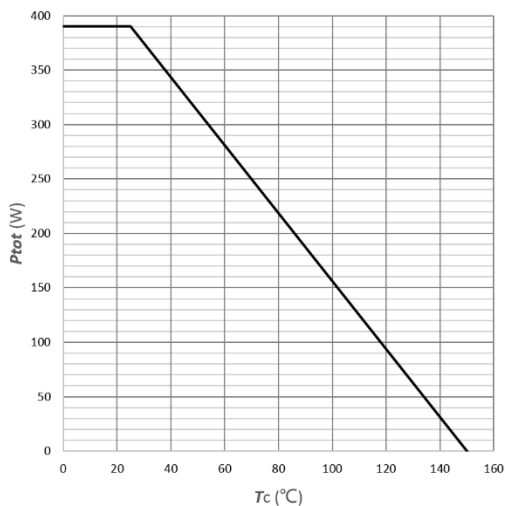
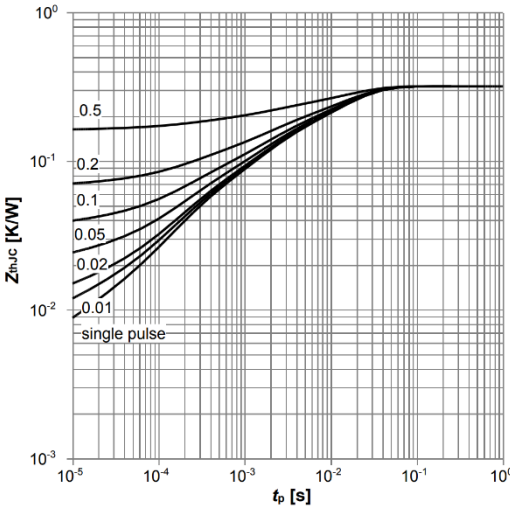
Power dissipation	Max. transient thermal impedance
 $P_{tot} = f(T_c)$	 $Z_{thjc} = f(t_p)$; parameter: $D = t_p/T$

Table 9

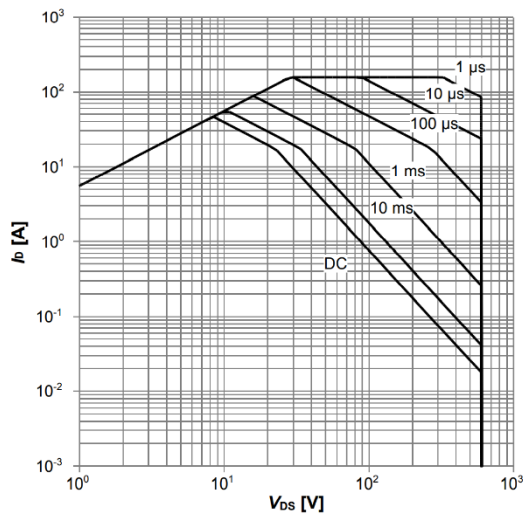
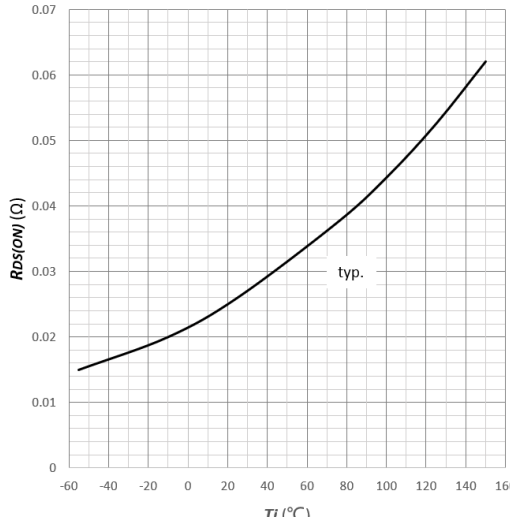
Safe operating area $T_c=25\text{ }^{\circ}\text{C}$	Drain-source on-state resistance
 $I_D = f(V_{DS})$; $T_C=25\text{ }^{\circ}\text{C}$; $V_{GS}>10\text{ V}$; $D=0$; parameter t_p	 $R_{DS(on)} = f(T_J)$; $I_D=40\text{ A}$; $V_{GS}=10\text{ V}$

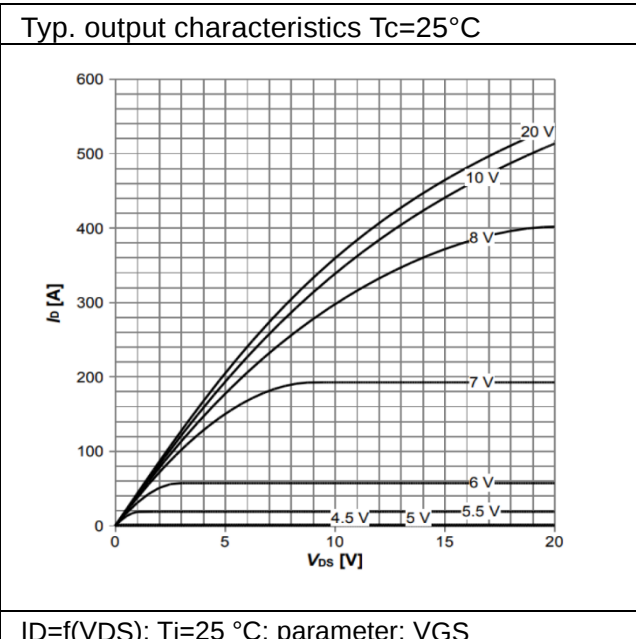
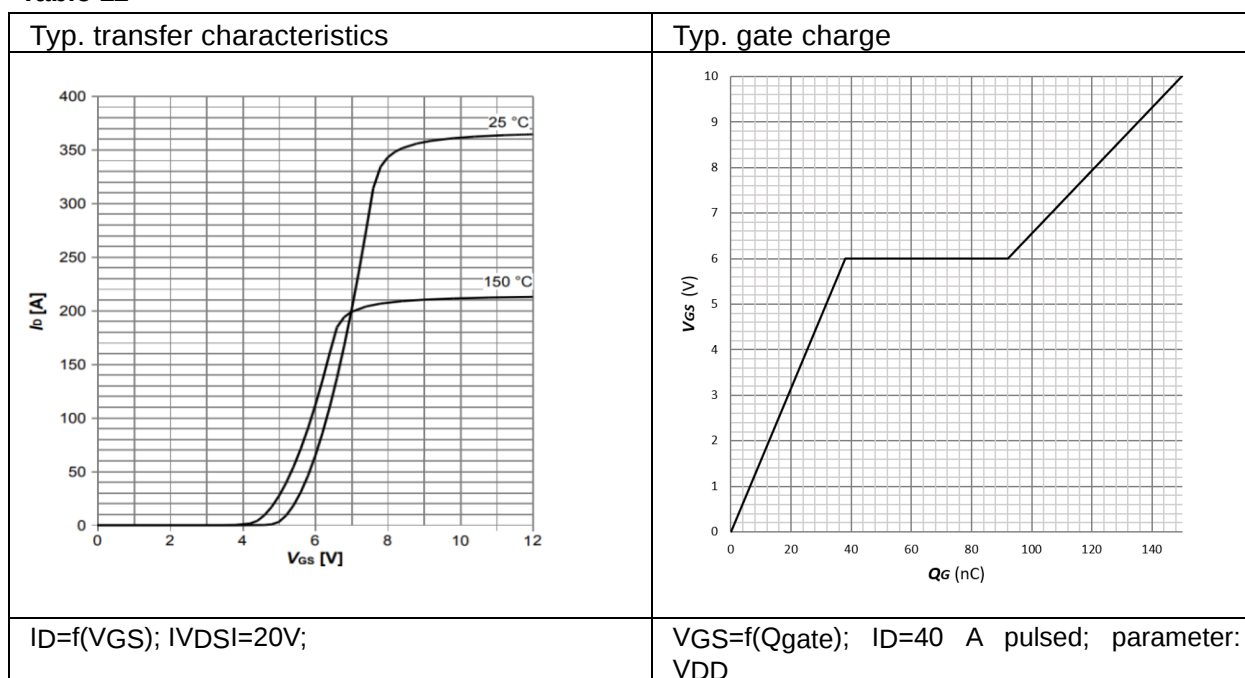
Table 10

Table 11


Table 12

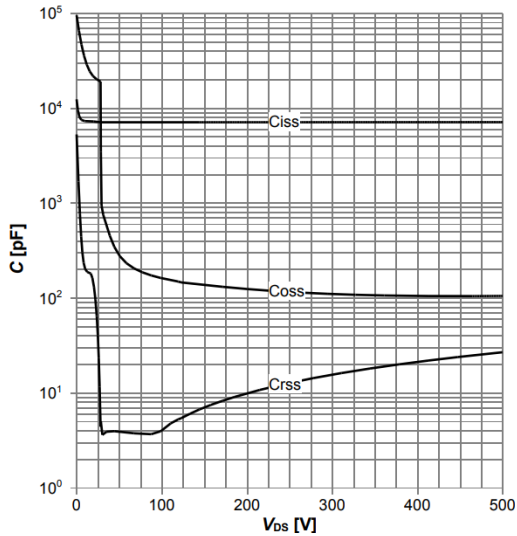
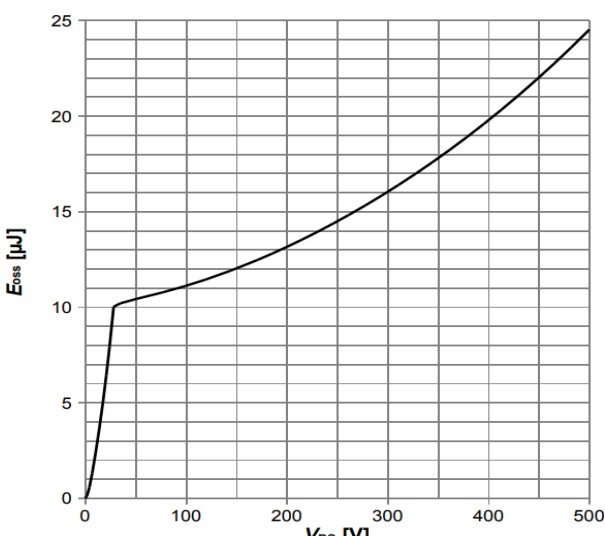
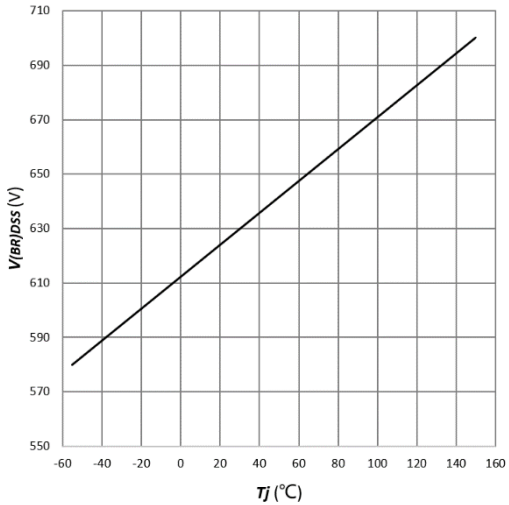
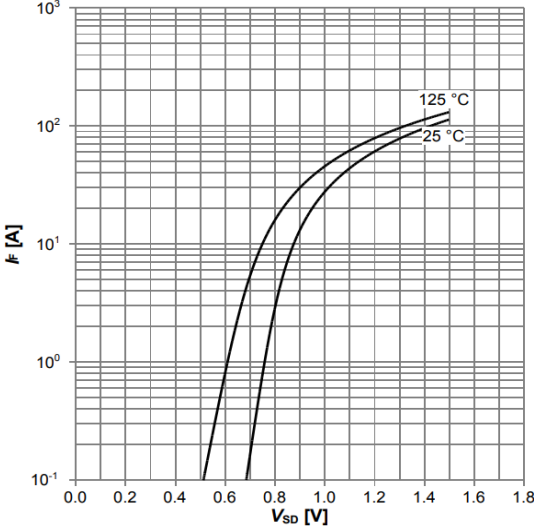
Typ. capacitances	Typ. Coss stored energy
	
$C=f(V_{DS}); V_{GS}=0\text{ V}; f=100\text{ kHz}$	$E_{oss}=f(V_{DS})$

Table 13

Drain-source breakdown voltage	Forward characteristics of reverse diode
	
$V_{BR}(DSS)=f(T_j); I_D=10\text{ mA}$	$I_F=f(V_{SD}); \text{parameter: } T_j$

6 Test Circuits

Table 14 Diode characteristics

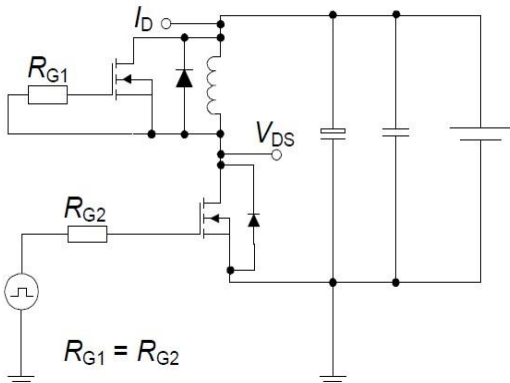
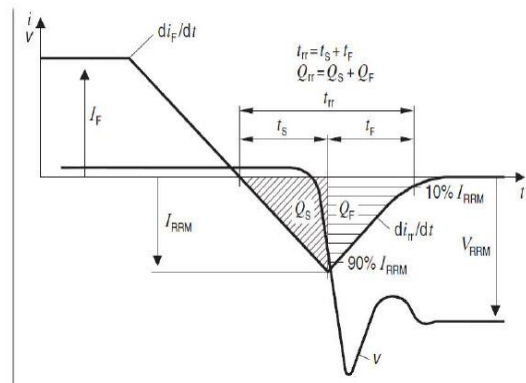
Test circuit for diode characteristics	Diode recovery waveform
 $R_{G1} = R_{G2}$	

Table 15 Switching times

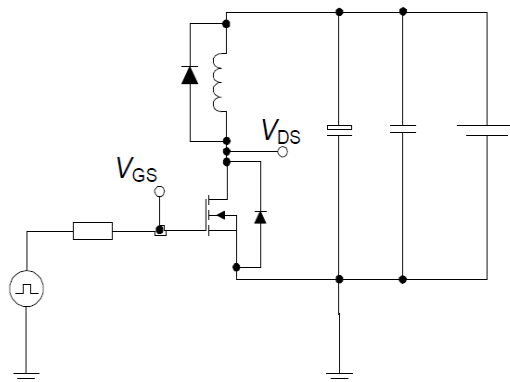
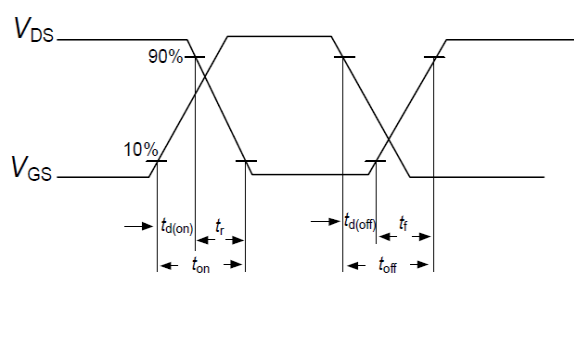
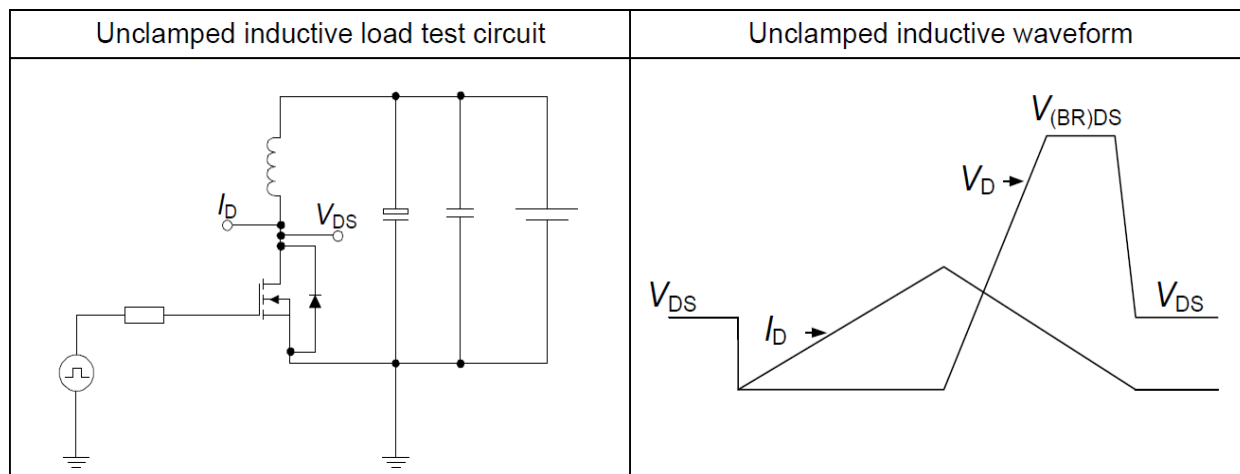
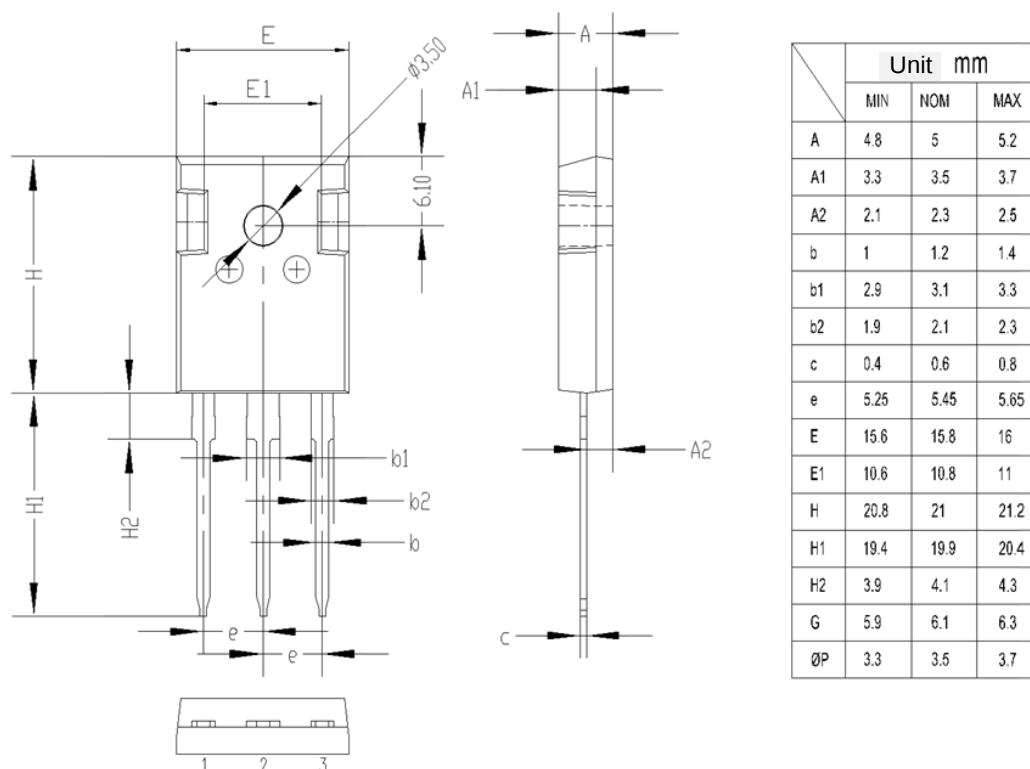
Switching times test circuit for inductive load	Switching times waveform
	

Table16 Unclamped inductive load


7 Package Outlines

Figure1: Outline of PG-T0247


8 Product Code

Figure2: Product number Decode

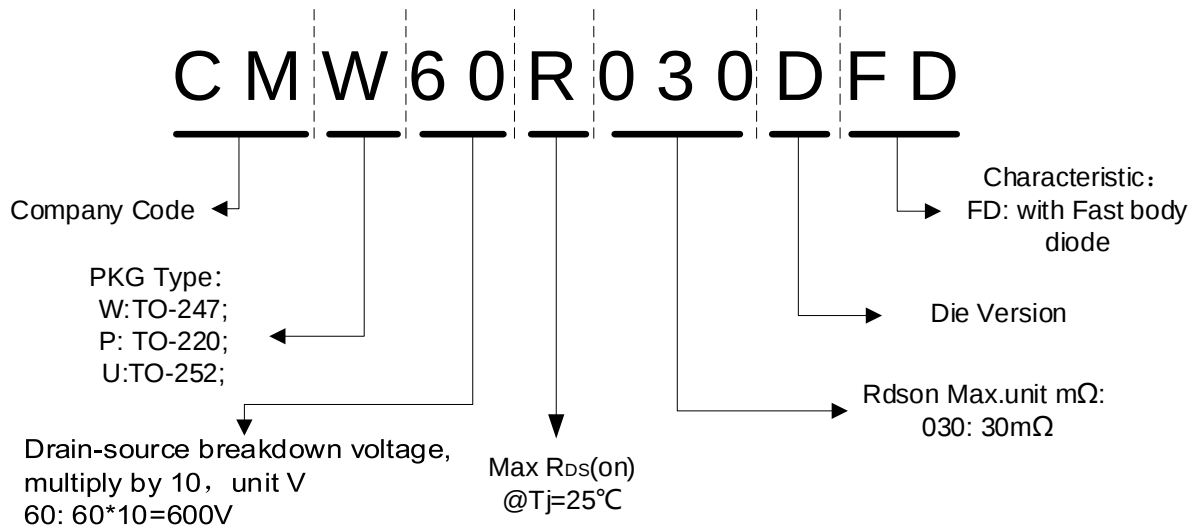
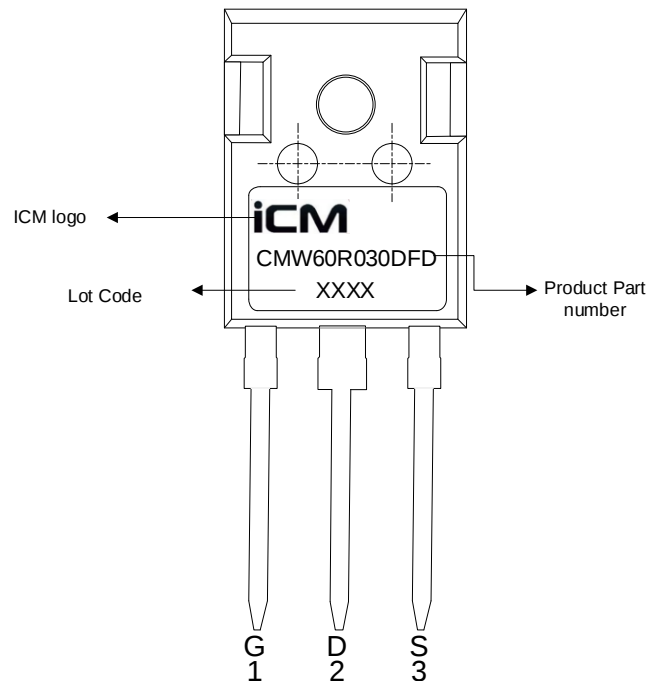


Figure3: Part Marking Information



Revision History

Revision	Date	Subjects (major changes since last revision)
1.0	2022-9-12	Preliminary version