# CMSC1653

**N-Channel Enhancement Mode MOSET**

## General Description

The CMSC1653 is designed to provide a high efficiency synchronous buck power stage with optimal layout and board space utilization. This device is well suited for use in compact DC/DC converter applications.

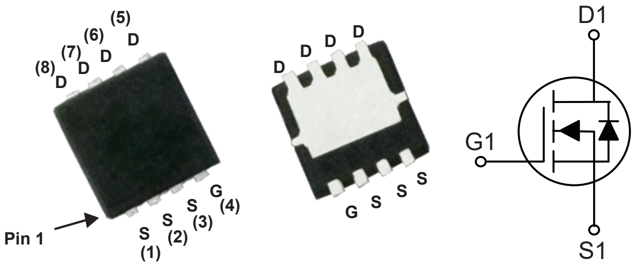
## Product Summary

| BVDSS | RDSON | ID |
|---|---|---|
| 30V | 7mΩ | 30A |

## Applications

- DC/DC Converters in Computing, Servers, and POL
- Isolated DC/DC Converters in Telecom and Industrial

## DFN-8 3.3x3.3 Pin Configuration




## Features

- 30V,30A, RDS(ON) =7mΩ @VGS = 10V
- Low Gate Charge
- High Current Capability
- RoHS Compliant

| Type | Package | Marking |
|---|---|---|
| CMSC1653 | DFN-8 3.3*3.3 | 1653 |

## Maximum Ratings and Thermal Characteristics ($T_A$ = 25℃ unless otherwise noted)

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 30 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$@$T_C$=25℃ | Continuous Drain Current | 30 | A |
| $I_D$@$T_C$=100℃ | | 22 | A |
| $I_{DM}$ | Pulsed Drain Current | 60 | A |
| EAS | Single Pulse Avalanche Energy[1] | 65 | mJ |
| $P_D$@$T_C$=25℃ | Total Power Dissipation | 25 | W |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | ℃ |

## Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Unit |
|---|---|---|---|---|
| $R_{θJA}$ | Thermal Resistance Junction-ambient(Steady-State) | --- | 90 | ℃/W |
| $R_{θJC}$ | Thermal Resistance Junction -Case(Steady-State) | --- | 5.4 | ℃/W |

## Electrical Characteristics ($T_J$=25 ℃ unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V , $I_D$=250μA | 30 | --- | --- | V |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$=10V , $I_D$=20A | --- | --- | 7 | mΩ |
| | | $V_{GS}$=4.5V , $I_D$=20A | --- | --- | 12 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$ , $I_D$ =250μA | 1 | --- | 2.5 | V |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=30V , $V_{GS}$=0V | --- | --- | 1 | uA |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$ =±20V , $V_{DS}$=0V | --- | --- | ±100 | nA |
| gfs | Forward Transconductance | $V_{DS}$=10V, $I_D$=5A | --- | 18 | --- | S |
| $R_g$ | Gate Resistance | $V_{DS}$=0V , $V_{GS}$=0V , f=1MHz | --- | 1.3 | --- | Ω |
| $Q_g$ | Total Gate Charge | $V_{DS}$=15V , $V_{GS}$=10V , $I_D$=13A | --- | 8 | --- | nC |
| $Q_{gs}$ | Gate-Source Charge | | --- | 1 | --- | |
| $Q_{gd}$ | Gate-Drain Charge | | --- | 2 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{DS}$=15V , $V_{GS}$=10V , $R_L$ =1.2Ω $R_{GEN}$=3Ω | --- | 3.5 | --- | ns |
| $T_r$ | Rise Time | | --- | 2.8 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 16.5 | --- | |
| $T_f$ | Fall Time | | --- | 3 | --- | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=15V , $V_{GS}$=0V , f=1MHz | --- | 1400 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 230 | --- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 28 | --- | |

## Diode Characteristics

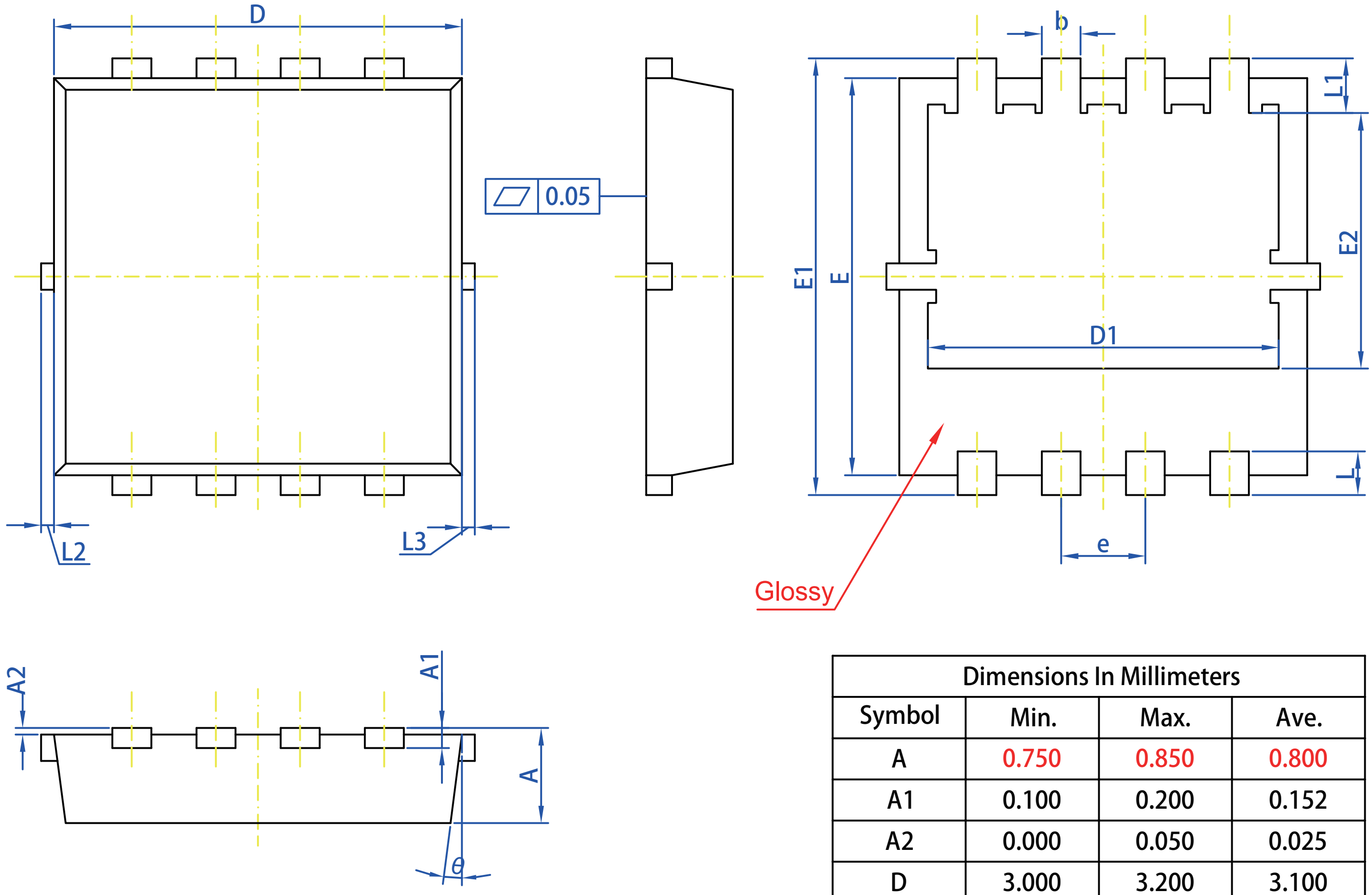
| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current | $V_G$=$V_D$=0V , Force Current | --- | --- | 30 | A |
| $V_{SD}$ | Diode Forward Voltage | $V_{GS}$=0V , $I_S$=20A | --- | --- | 1 | V |

Notes:

1. L=1.3mH ,$I_{AS}$=10A ,$V_D$=15V, Starting $T_J$=25℃.

## Package Dimensions

# DFN-8 3.3*3.3 Package Outline Drawing




| Dimensions In Millimeters | | | |
|---|---|---|---|
| Symbol | Min. | Max. | Ave. |
| A | 0.750 | 0.850 | 0.800 |
| A1 | 0.100 | 0.200 | 0.152 |
| A2 | 0.000 | 0.050 | 0.025 |
| D | 3.000 | 3.200 | 3.100 |
| D1 | 2.610 | 2.810 | 2.710 |
| E | 3.000 | 3.200 | 3.100 |
| E1 | 3.300 | 3.500 | 3.400 |
| E2 | 1.830 | 2.030 | 1.930 |
| b | 0.200 | 0.400 | 0.300 |
| e | 0.550 | 0.750 | 0.650 |
| L | 0.350 | 0.550 | 0.450 |
| L1 | 0.365 | 0.565 | 0.455 |
| L2 | 0~0.100 | | |
| L3 | 0~0.100 | | |
| $\theta$ | 6° | 12° | 9° |

Note:

1. Smooth surface Ra=0.1; unmarked surface is matte surface Ra=1.0~1.2
2. Unmarked tolerance ± 0.05, unmarked fillet, R max=0.25
3. The plastic package has no defects such as defects, shrinkage holes, cracks, bubbles, etc.
4. Marking unit mm
5. Misalignment between the center of the plastic package and the center of the lead frame≤0.05