

**Specification of Diagnostic Communication  
(Diagnostics on CAN - Standardized)**

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### **1. Scope**

This specification prescribes about Identifier specification used with Application Layer utilized for data communication between the electronic control unit (ECU) and a diagnostic tool on CAN bus.

### **2. Application**

This specification applies to ECUs and a diagnosis tester to execute data communication on CAN bus.

### **3. Definition of Terms**

The key terms used in this specification are defined as follows:

#### (1) \$

The values following to the symbol \$ are the number of hexadecimal.  
(Store appropriate numerical value in "\$XX").

#### (2) Message Usage

The following symbols indicate the nature of each byte composing a message as follows:

- M (Mandatory) : The data byte is supported by all means.
- C (Conditional) : A support of the data byte depends on each Identifier.
- O (Optional) : A support of the data byte is optional handling.

**4. Standardized Data Identifiers**

Table4.1 Data Identifier definitions

Hex	Description	Details	Remarks
\$00 00 - \$00 FF	Reserved	-	
\$01 00 - \$01 5F	Vehicle Manufacture Specific - Data (Predefined Manufacture Specific Data Identifier)	-	
\$01 60 - \$CF FF	Vehicle Manufacture Specific - Data	-	
\$D0 00 - \$DF FF	Vehicle Manufacture Specific - Input/Output Control	-	
\$E0 00 - \$EF FF	Reserved	-	
\$F0 00 - \$F0 0F	Network Configuration Data For Tractor Trailer Application	-	Refer to ISO 11992-4
\$F0 10 - \$F0 FF	Reserved	-	
\$F1 00 - \$F 17F	Identification Option - Vehicle Manufacture Specific	-	
\$F1 00 - \$F1 0B	Reserved	-	
<b>\$F1 0C</b>	<b>Diagnostic Variant Code</b>	<b>Section 5.1</b>	
\$F1 0D - \$F1 17	Reserved	-	
<b>\$F1 18</b>	<b>Hardware Part Number</b>	<b>Section 5.2</b>	
\$F1 19 - \$F1 27	Reserved	-	
<b>\$F1 28</b>	<b>Software Part Number</b>	<b>Section 5.3</b>	
\$F1 29 - \$F1 37	Reserved	-	
<b>\$F1 38</b>	<b>ECU Part Number</b>	<b>Section 5.4</b>	
\$F1 39 - \$F1 4F	Reserved	-	
<b>\$F1 50</b>	<b>Hardware Version Information</b>	<b>Section 5.5</b>	
<b>\$F1 51</b>	<b>Software Version Information</b>	<b>Section 5.6</b>	
\$F1 52 - \$F1 53	Reserved	-	
<b>\$F1 54</b>	<b>Hardware Supplier Identification</b>	<b>Section 5.9</b>	
<b>\$F1 55</b>	<b>Hardware Supplier Identification</b>	<b>Section 5.10</b>	
\$F1 56 - \$F1 5A	Reserved	-	
<b>\$F1 5B</b>	<b>Read Software Fingerprint</b>	<b>Section 5.7</b>	
\$F1 5C - \$F1 8B	Reserved	-	
<b>\$F1 8C</b>	<b>ECU Serial Number</b>	<b>Section 5.8</b>	
\$F1 8D	Supported Functional Units	-	Refer to ISO 11992-4
\$F1 8E - \$F1 EF	Reserved	-	
\$F1 F0 - \$F1 FF	Identification Option System Supplier Specific	-	
\$F2 00 - \$F3 FF	Reserved	-	
\$F4 00 - \$F4 FF	OBD PIDs	-	Refer to ISO 15031-5
\$F5 00 - \$F5 FF	OBD PIDs - Reserved	-	
\$F6 00 - \$F6 FF	OBD Monitor IDs	-	
\$F7 00 - \$F7 FF	OBD Monitor Ids - Reserved	-	
\$F8 00 - \$F8 FF	OBD Info Types	-	
\$F9 00 - \$F9 FF	Tachograph PIDs - Reserved	-	Refer to ISO 16844-7
\$FA 00 - \$FA FF	Safety System PIDs - Reserved	-	
\$FB 00 - \$FC FF	Reserved	-	
\$FD 00 - \$FD FF	System Supplier Specific - Data	-	
\$FE 00 - \$FE FF	System Supplier Specific - Input/Output Control	-	
\$FF 00 - \$FF FF	Reserved	-	

**5. Details of Standardized Data Identifiers**

**5.1 Diagnostic Variant Code (\$F1 0C)**

Upon requesting this Data Identifier (\$F1 0C) with diagnostic service Read Data by Identifier (\$22), the ECU shall report the diagnostic specification supported.

The data content except Data Identifier shall be shown in table5.1.

In addition, all ECU to communicate with the diagnostic tool must support this Data Identifier.

Table5.1 Diagnostic Variant Code Positive Response Data Record Definition

Data byte no.	Parameter name / Description	Message Usage	Data value
4	Reserved by document to set to zero	M	\$00
5	Reserved by document to set to zero	M	\$00
6	System Check Code (SCC High Byte)	M	\$XX
7	System Check Code (SCC Low Byte)	M	\$XX

**System Check Code (SCC)**

It uses to identify an ECU by the diagnostic tool.

In addition, in case diagnosis specification of the ECU is different, the ECU uses different SCC.

**Positive Response example)**

In case the SCC is \$12 34, the ECU shall send the Positive Response as table 5.2.

Table5.2 Diagnostic Variant Code Positive Response example

Data byte no.	Parameter name / Description	Message Usage	Data value
1	Read Data By Identifier Service Id	M	\$62
2	Data Identifier - Read Diagnostic Variant Code (MSB)	M	\$F1
3	Data Identifier - Read Diagnostic Variant Code (LSB)	M	\$0C
4	Reserved by document to set to zero	M	\$00
5	Reserved by document to set to zero	M	\$00
6	System Check Code (SCC High Byte)	M	\$12
7	System Check Code (SCC Low Byte)	M	\$34

**5.2 Hardware Part Number (\$F1 18)**

Upon requesting this Data Identifier (\$F1 18) with diagnostic service Read Data by Identifier (\$22), the ECU shall return the Hardware Part Number of the ECU (made by MFTBC).

The data content except Data Identifier shall be shown in table 5.3.

Table5.3 Hardware Part Number Positive Response Data Record Definition

Data byte no.	Parameter name / Description	Message Usage	Data value
4	Hardware Part Number (ASCII) Part Number High Byte	M	\$00 - \$FF
:	:		:
m+4	Part Number Low Byte		\$00 - \$FF

m: The number of digit

**5.3 Software Part Number (\$F1 28)**

Upon requesting this Data Identifier (\$F1 28) with diagnostic service Read Data by Identifier (\$22), the ECU shall return the Software Part Number of the ECU (made by MFTBC).

The data content except Data Identifier shall be shown in table 5.4.

Table5.4 Software Part Number Positive Response Data Record Definition

Data byte no.	Parameter name / Description	Message Usage	Data value
4	Software Part Number (ASCII) Part Number High Byte	M	\$00 - \$FF
:	:		:
m+4	Part Number Low Byte		\$00 - \$FF

m: The number of digit

**5.4 ECU Part Number (\$F1 38)**

Upon requesting this Data Identifier (\$F1 38) with diagnostic service Read Data by Identifier (\$22), the ECU shall return the ECU Part Number of the ECU (made by MFTBC).

The data content except Data Identifier shall be shown in table 5.5.

In addition, all ECU to communicate with the diagnostic tool must support this Data Identifier.

Table5.5 ECU Part Number Positive Response Data Record Definition

Data byte no.	Parameter name / Description	Message Usage	Data value
4	ECU Part Number (ASCII) Part Number High Byte	M	\$00 - \$FF
:	:		:
m+4	Part Number Low Byte		\$00 - \$FF

m: The number of digit

**5.5 Hardware Version Information (\$F1 50)**

Upon requesting this Data Identifier (\$F1 50) with diagnostic service Read Data by Identifier (\$22), the ECU shall return the Hardware Version Information of the ECU.

The data content except Data Identifier shall be shown in table 5.6.

Table5.6 Hardware Version Information Positive Response Data Record Definition

Data byte no.	Parameter name / Description	Message Usage	Data value
4	Hardware Version Information Major Byte (year)	M	\$00 - \$FF
5	Middle Byte (week)		\$00 - \$35
6	Minor Byte (patch level)		\$00 - \$FF

Patch level

The patch level shall indicate the number of change in week defined by Major and Middle Byte.

If no patch level is applicable, \$00 shall be reported as default.

Positive Response example)

In case of following ECU hardware version, the ECU shall send the Positive Response as table 5.7.

- Year : 2005

- Week : 42

- Patch level : 03

Table5.7 Hardware Version Information Positive Response example

Data byte no.	Parameter name / Description	Message Usage	Data value
1	Read Data By Identifier Service Id	M	\$62
2	Data Identifier - Read Hardware Version Information (Byte #1)	M	\$F1
3	Data Identifier - Read Hardware Version Information (Byte #2)	M	\$50
4	Hardware Version Information Year = \$05	M	\$05
5	Hardware Version Information Week = \$2A	M	\$2A
6	Hardware Version Information Patch level = \$03	M	\$03

**5.6 Software Version Information (\$F1 51)**

Upon requesting this Data Identifier (\$F1 51) with diagnostic service Read Data by Identifier (\$22), the ECU shall return the Software Version Information of the ECU.  
 The data content except Data Identifier shall be shown in table 5.8.

Table5.8 Software Version Information Positive Response Data Record Definition

Data byte no.	Parameter name / Description	Message Usage	Data value
	Software Version Information		
4	Major Byte (year)	M	\$00 - \$FF
5	Middle Byte (week)		\$00 - \$35
6	Minor Byte (patch level)		\$00 - \$FF
	Software Logical Block #1 Version Information		
7	Major Byte (year)	C	\$00 - \$FF
8	Middle Byte (week)		\$00 - \$35
9	Minor Byte (patch level)		\$00 - \$FF
:	:	:	:
	Software Logical Block #n Version Information		
4n	Major Byte (year)	C	\$00 - \$FF
4n+1	Middle Byte (week)		\$00 - \$35
4n+2	Minor Byte (patch level)		\$00 - \$FF

C: These message data parameters shall only be supported, if more than one logical block in an ECU is programmable.

**Patch level**

The patch level shall indicate the number of change in week defined by Major and Middle Byte.  
 If no patch level is applicable, \$00 shall be reported as default.

**5.7 Read Software Fingerprint (\$F1 5B)**

Upon requesting this Data Identifier (\$F1 5B) with diagnostic service Read Data by Identifier (\$22), the ECU shall return the Software Fingerprint Information.  
The data content except Data Identifier shall be shown in table 5.9.

Table5.9 Read Software Fingerprint Positive Data Record Definition

Data byte no.	Parameter name / Description	Message Usage	Data value
4	Fingerprint Logic Block No.1 Status Information - Logic Block No.1 (set to zero (\$00) at present)	M	\$00 - \$FF
5 6	Supplier Identification - Logical Block No.1 Supplier Identification High Byte Supplier Identification Low Byte	M	\$00 - \$FF \$00 - \$FF
7 8 9	Programming Date - Logical Block No.1 Year Month Day	M	\$05 - \$FF \$01 - \$0C \$01 - \$1F
10 11 12 13	Diagnostic Tool Serial Number - Logical Block No.1 High Byte : : Low Byte	M	\$00 - \$FF \$00 - \$FF \$00 - \$FF \$00 - \$FF
14	Fingerprint Logic Block No.2 Status Information - Logic Block No.2	C	\$00 - \$FF
15 16	Supplier Identification - Logical Block No.2 Supplier Identification High Byte Supplier Identification Low Byte	C	\$00 - \$FF \$00 - \$FF
:	:	:	:
10n + 4	Fingerprint Logic Block No.n Status Information - Logic Block No.n	C	\$00 - \$FF \$00 - \$FF
10n + 5 10n + 6	Supplier Identification - Logical Block No.n Supplier Identification High Byte Supplier Identification Low Byte	C	\$00 - \$FF \$00 - \$FF
10n + 7 10n + 8 10n + 9	Programming Date - Logical Block No.n Year Month Day	C	\$05 - \$FF \$01 - \$0C \$01 - \$1F
10n + 10 10n + 11 10n + 12 10n + 13	Diagnostic Tool Serial Number - Logical Block No.n High Byte : : Low Byte	C	\$00 - \$FF \$00 - \$FF \$00 - \$FF \$00 - \$FF

C: These message data parameters shall only be supported, if more than one logical block in an ECU is programmable.

In the Software Fingerprint of an ECU, following data is stored.

(If the ECU is preprogrammed by the supplier manufacturing line, the Diagnostic Tool Serial Number shall be set to \$00 00 00 00.)

- Supplier Identification : Define separately
- Programming Date : The software release date
- Diagnostic Tool Serial Number : The serial number of diagnostic tool

The ECU shall report the following data if a logical block has never been programmed.

(e.g. the ECU is delivered from the supplier, not programmed, and running in the boot software)

- Supplier Identification : \$FF FF
- Programming Date : \$FF FF FF
- Diagnostic Tool Serial Number : \$FF FF FF FF



**5.8 ECU Serial Number (\$F1 8C)**

Upon requesting this Data Identifier (\$F1 8C) with diagnostic service Read Data by Identifier (\$22), the ECU shall return the Serial Number of the ECU.

The data content except Data Identifier shall be shown in table 5.10.

Table5.10 ECU Serial Number Positive Data Record Definition

Data byte no.	Parameter name / Description	Message Usage	Data value
4	ECU Serial Number (MSB)	M	\$00 - \$FF
:	:	:	:
n	ECU Serial Number (LSB)	M	\$00 - \$FF

**5.9 Hardware Supplier Identification (\$F1 54)**

Upon requesting this Data Identifier (\$F1 54) with diagnostic service Read Data by Identifier (\$22), the ECU shall return the Hardware Supplier Information needed by the diagnostic tool to identify the Supplier of the hardware.

The data content except Data Identifier shall be shown in table 5.11.

Table5.11 Hardware Supplier Identification Positive Data Record Definition

Data byte no.	Parameter name / Description	Message Usage	Data value
4	Hardware Supplier Identification High Byte	M	\$00 - \$FF
5	Hardware Supplier Identification Low Byte		

Hardware Supplier Identification  
Define separately.

**5.10 Software Supplier Identification (\$F1 55)**

Upon requesting this Data Identifier (\$F1 55) with diagnostic service Read Data by Identifier (\$22), the ECU shall return the Software Supplier Information needed by the diagnostic tool to identify the Supplier of the software.

The data content except Data Identifier shall be shown in table 5.12.

Table5.12 Software Supplier Identification Positive Data Record Definition

Data byte no.	Parameter name / Description	Message Usage	Data value
4	Supplier Logical Block #1 Supplier Identification High Byte	M	\$00 - \$FF
5	Supplier Logical Block #1 Supplier Identification Low Byte		
6	Supplier Logical Block #2 Supplier Identification High Byte	C	\$00 - \$FF
7	Supplier Logical Block #2 Supplier Identification Low Byte		
:	:		
2n+2	Supplier Logical Block #n Supplier Identification High Byte	C	\$00 - \$FF
2n+3	Supplier Logical Block #n Supplier Identification Low Byte		

C: Dependent on the number of the programmable logical blocks in a specific ECU.

Software Supplier Identification  
Define separately.

Non-flash reprogrammable ECUs shall only report one Software Supplier Information unit for the application software (Logical Block #1) currently running.  
Flash reprogrammable ECUs shall report as much Software Supplier Information units as there are programmable Logical Blocks within the respective ECU.  
If the logical block has never been programmed, the Software Supplier Information shall be set to \$FF FF.