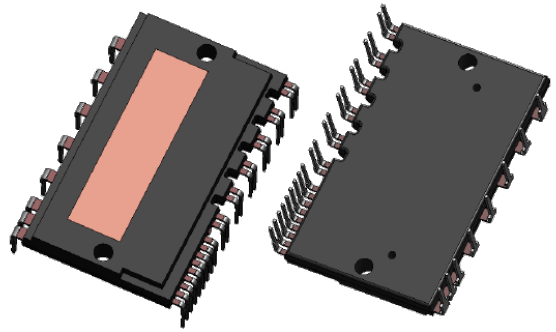
Working Together for a Greener Society

Future of Power Electronics and the Earth

High Voltage 3-phase Motor Drivers

SAM212MxxAF1 Series



■ Overview

The SAM212MxxAF1 series are 3-phase brushless motor drivers in which output transistors, pre-drive circuits, bootstrap diodes with current-limiting resistors, and a temperature-sensing thermistor are highly integrated.

These products are suitable for driving 3-phase motor of an automotive high voltage auxiliary equipment system.

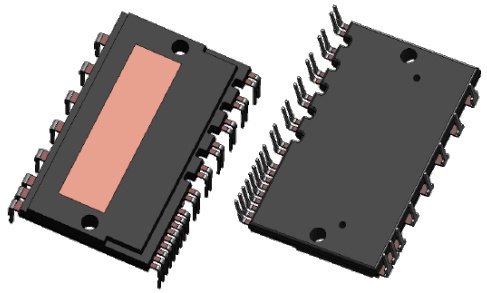
■ Application

For driving 3-phase motor of the following high voltage auxiliary equipment system such as electrified vehicles (xEV):

- Electric Compressor
- Electric Oil Pump
- Electric Water Pump

■ Package

DIP30 (LF2540/LF2541)



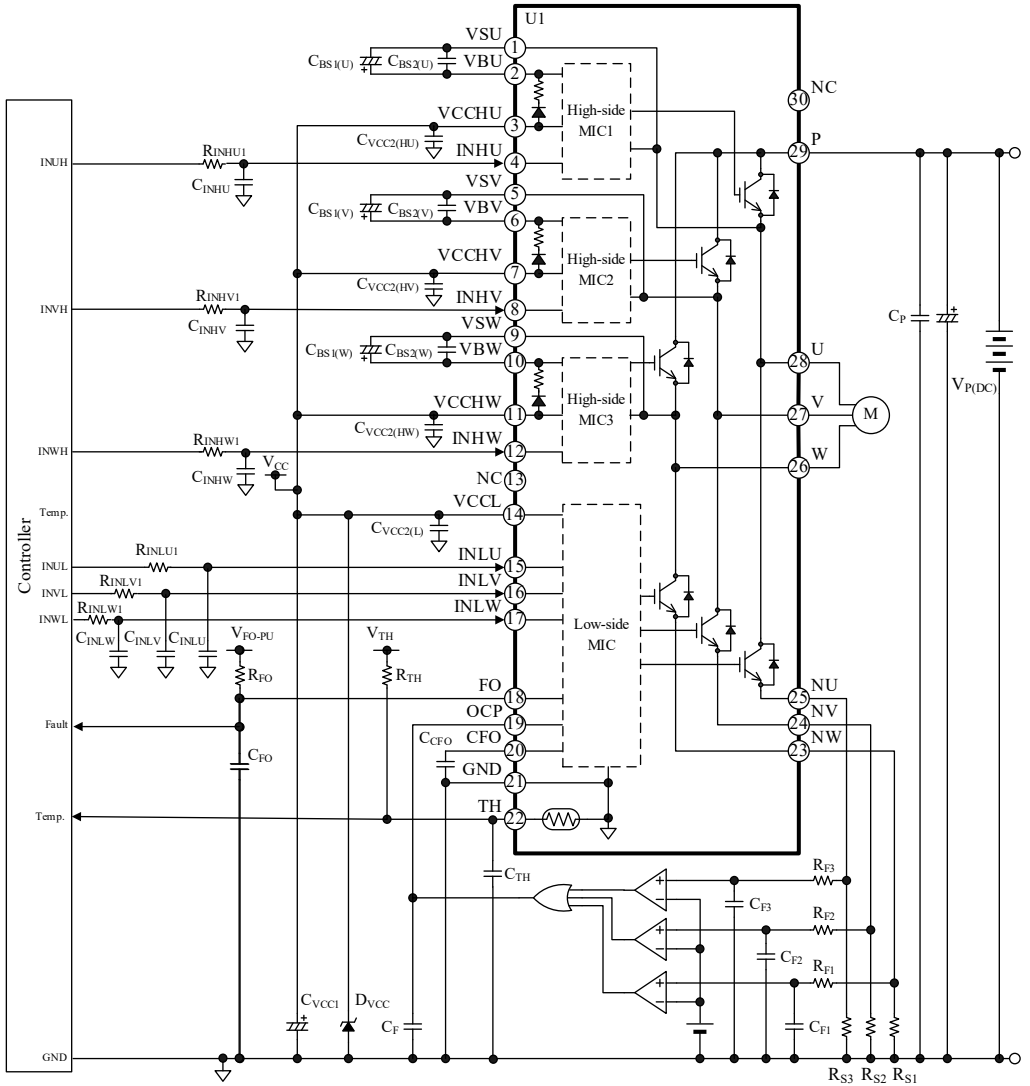
■ Selection Guide

Part Number	V_{CES}	I_C	$V_{CE(SAT)}$ (Typ.)	Thermal Resistance (Max.)
SAM212M05AF1 (Under development)	1200 V	5 A	1.4 V (TBD)	1.3 °C/W
SAM212M10AF1 (Under development)		10 A	1.7 V (TBD)	1.3 °C/W
SAM212M15AF1		15 A	1.7 V	1.1 °C/W

■ Features

- AQG324 Qualified
- Pb-free (RoHS Compliant)
- Isolation Voltage: 2500 V (for 1 min)
- Built-in Thermistor
- Built-in Bootstrap Diodes
- CMOS-compatible Input (3.3 V or 5 V)
- Fault Signal Output at Protection Activation
- Shutdown Signal Input
- Adjustable OCP Hold Time
- Protections Functions
  - Undervoltage Lockout for Power Supply
    - VBx Pin (UVLO_VBx): Auto-restart
    - VCCL Pin (UVLO_VCCL): Auto-restart
  - Overcurrent Protection (OCP): Auto-restart

■ Typical Application

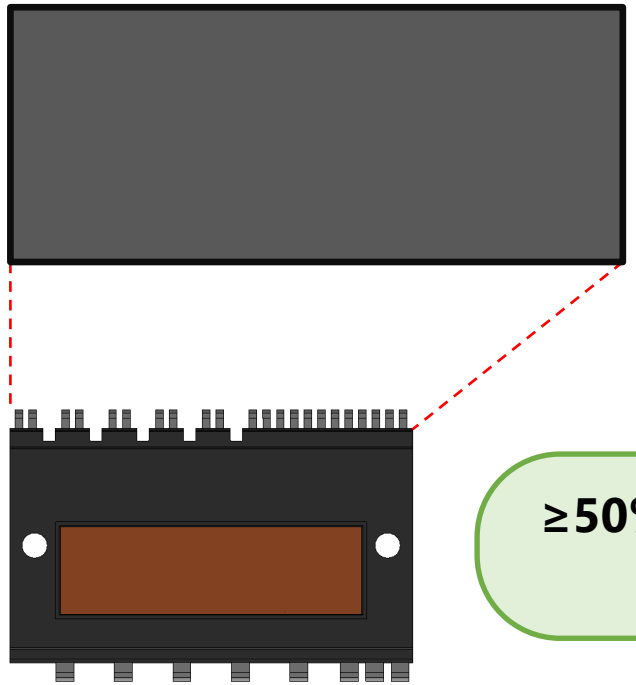


Industry's Smallest Package for Automotive 1200 V IPMs

Our IPMs are supplied in a compact DIP30 package, which is the industry's smallest* for 1200 V automotive IPMs. They feature a guaranteed isolation voltage of 2500 V for 1 min.

Competitors' automotive 1200 V IPM

SAM212MxxAF1 series
DIP30（52.5 mm × 31 mm × 5.6 mm）



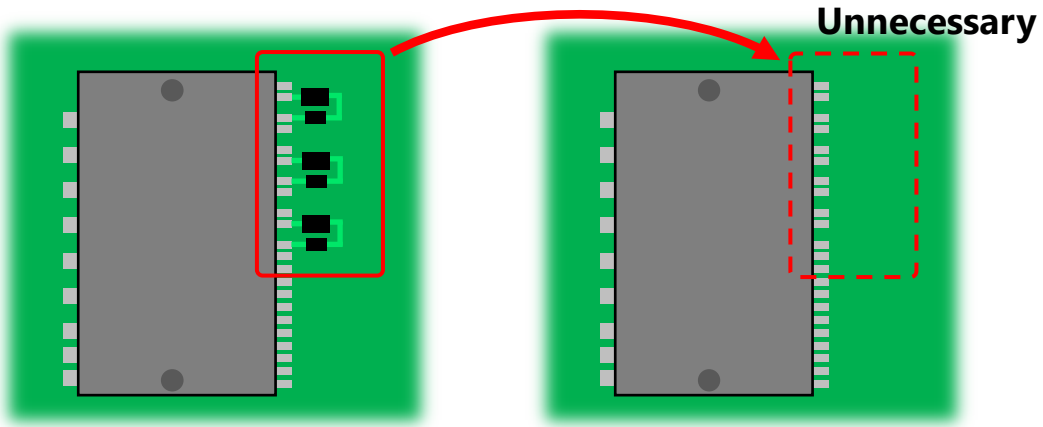
≥50% smaller mold volume than competitors*

* as of August 2025

The single-packaging approach reduces external parts to be mounted.

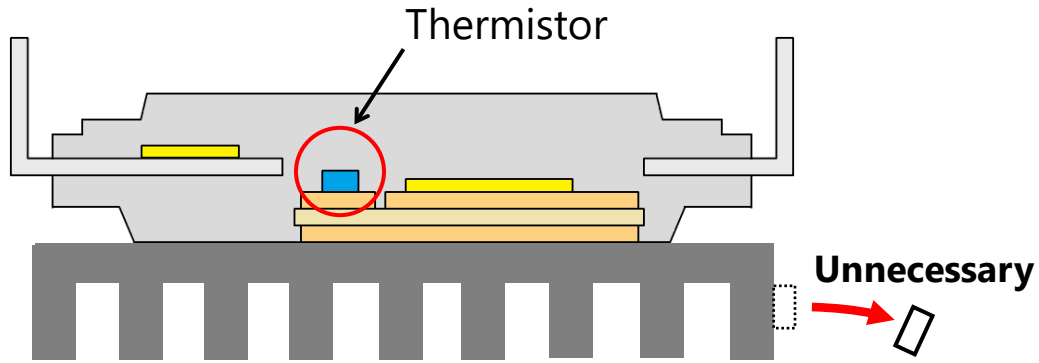
No need to add external bootstrap diodes + current-limiting resistors

< Schematic View >



No need to add an external temperature-sensing thermistor

< Schematic View >

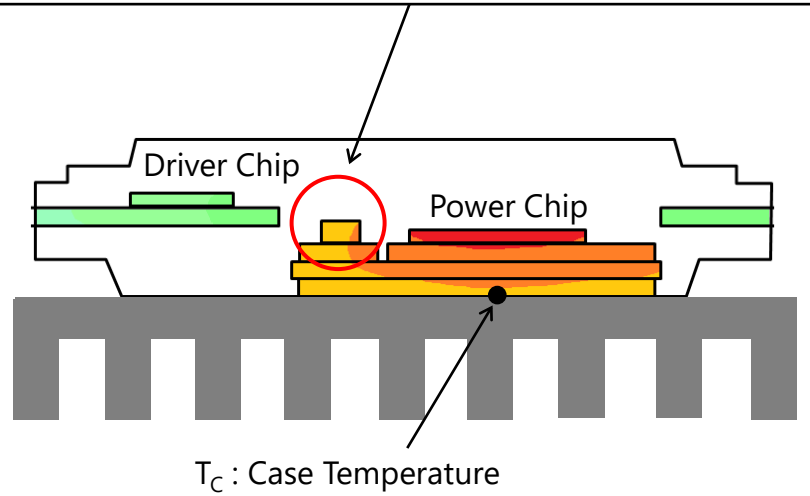


- **Smaller-sized applications**
- **Larger mountable area on a PCB**
- **Less reliability risk from parts mounting**
- **Lower costs in materials and processing**

Placing a thermistor on the DBC substrate along with the power chip (IGBTs + freewheeling diodes) resulted in vastly improved temperature-sensing accuracy.

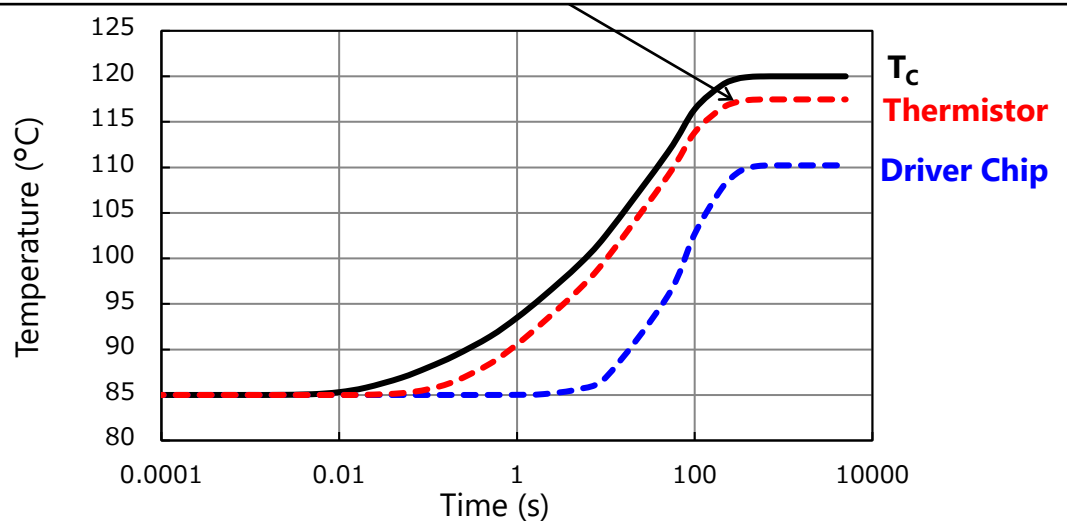
Thermistor Mounting Position (Schematic View)

Thermistor is placed on the DBC substrate, not on the lead frame.



Temperature Comparison

Thermistor temperature is detectable as a near-T_C value.

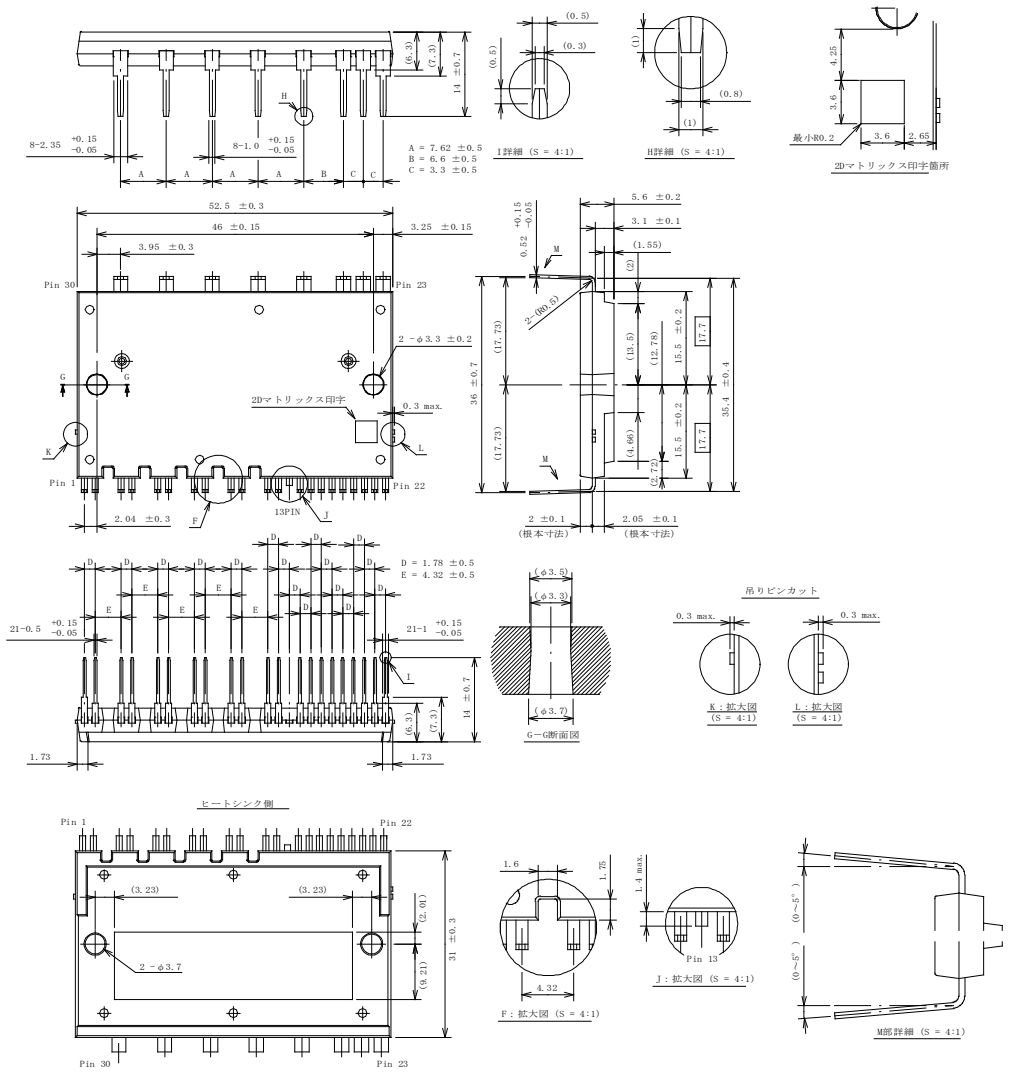


- **More accurate temperature sensing**
- **Higher followability to rapid temperature changes**

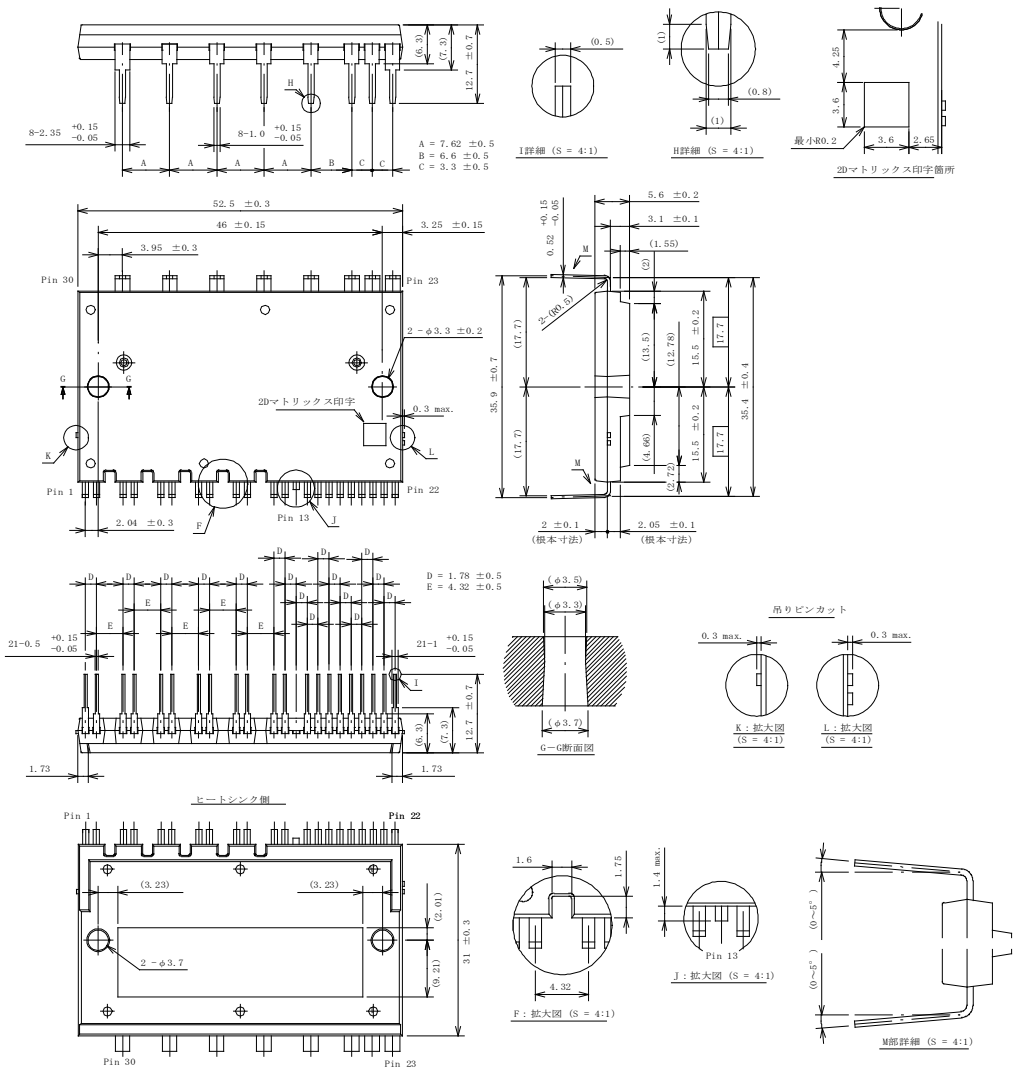
Your application will have more quality with this precise T_C sensing.

Physical Dimensions

DIP30 (LF2540)



DIP30 (LF2541)



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