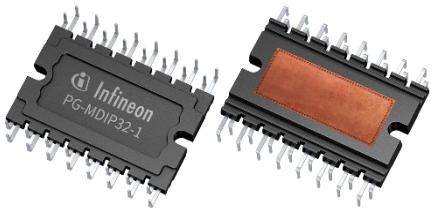
CIPOS™ Prime

AMF12S54LB2Z



Features

- 1200 V SiC MOSFET 4-pack
- 54 mΩ of typical $R_{DS(on)}$ at V_{GS} = 18 V, T_J = 25°C
- Maximum operating T_J = 175°C
- Very low switching losses
- Robust against parasitic turn on, 0 V turn-off gate voltage can be applied
- Robust body diode for hard commutation
- High performance AlN DCB substrate
- Integrated NTC thermistor

Potential applications

- On-board charger
- DC-DC converter
- EV charging
- Power conversion AC-DC, DC-AC

Product validation

Qualified for automotive applications

Product validation according to AEC-Q101 / 200 and AQG 324.

Description

The CIPOS™ Prime product offers an integrated solution for high frequency power conversion applications. The power module includes four SiC MOSFETs and a NTC and enables high power density. Infineon's SiC technology provides excellent switching performance, wide range of gate-source voltage, and benchmark gate threshold voltage. The DCB substrate enables optimal thermal performance and package is designed to ensure a high creepage distance.

Table 1 Product Information

Base Part Number	Package Type	Standard Pack		Sales Product Number
		Form	MOQ	
AMF12S54LB2Z	DIP 44x28DA	11 pcs / Tube	176 pcs	SP006061262

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1 MOSFET

Table 2 Maximum ratings

Description	Symbol	Condition	Values	Unit
Drain-source voltage	V_{DSS}	$T_J \geq 25°C$	1200	V
Continuous drain current for $R_{th(j-c)}$, limited by $T_{J.max}$	I_D	V_{GS} = 18 V, T_C = 25°C	32	A
		V_{GS} = 18 V, T_C = 100°C	23	
Peak drain current, t_p limited by $T_{J.max}$	I_{DM}	V_{GS} = 18 V	69	A
Gate-source voltage, max. transient voltage	V_{GS}	$t_p \leq 0.5$ µs, D < 0.01	-10 ~ 23	V
Gate-source voltage, max. static voltage	V_{GS}		-5 ~ 20	V
Power dissipation per switch	P_D		138	W
Operating junction temperature	T_J		-40 ~ 175	°C

Table 3 Recommended values

Description	Symbol	Condition	Values	Unit
Turn-on gate-source voltage	$V_{GS(on)}$		15 ~ 18	V
Turn-off gate-source voltage	$V_{GS(off)}$		-3 ~ 0	V

Table 4 Electrical characteristics

(T_J = 25°C if not stated otherwise)

Description	Symbol	Condition	Values			Unit
			Min.	Typ.	Max.	
Drain-source on-state resistance	$R_{DS(on)}$	I_D = 12.9 A, V_{GS} = 18 V		54	76.1	mΩ
		I_D = 12.9 A, V_{GS} = 18 V, T_J = 175°C		128		
		I_D = 12.9 A, V_{GS} = 15 V		66		
Gate-source threshold voltage	$V_{GS(th)}$	I_D = 4.1 mA, V_{DS} = V_{GS}	3.5	4.2	5.1	V
		I_D = 4.1 mA, V_{DS} = V_{GS}, T_J = 175°C		3.2		
Zero gate-voltage drain current	I_{DSS}	V_{DS} = 1200 V, V_{GS} = 0 V			110	µA
		V_{DS} = 1200 V, V_{GS} = 0 V, T_J = 175°C		2		
Gate leakage current	I_{GSS}	V_{DS} = 0 V, V_{GS} = 23 V			120	nA
		V_{DS} = 0 V, V_{GS} = -10 V			-120	
Forward transconductance	g_{fs}	I_D = 12.9 A, V_{DS} = 20 V		5.7		S

Description	Symbol	Condition	Values			Unit
			Min.	Typ.	Max.	
Internal gate resistance	$R_{G,int}$	f = 1 MHz, V_{AC} = 25 mV		13		Ω
Input capacitance	C_{iss}	V_{DS} = 800 V, V_{GS} = 0 V, f = 100 kHz, V_{AC} = 25 mV		971		pF
Output capacitance	C_{oss}			55		
Reverse transfer capacitance	C_{rss}			6.2		
C_{oss} stored energy	E_{oss}			22		µJ
Total gate charge	Q_G	V_{DS} = 800 V, I_D = 12.9 A, V_{GS} = 0 to 18 V		34		nC
Plateau gate charge	$Q_{GS(pl)}$			15		
Gate-to-drain charge	Q_{GD}			7.2		
Turn-on energy	E_{on}	V_{DS} = 800 V, I_D = 12.9 A, V_{GS} = 0 to 18 V, R_G = 5 Ω		80		µJ
		V_{DS} = 800 V, I_D = 12.9 A, V_{GS} = 0 to 18 V, R_G = 5 Ω, T_J = 175°C		95		
Turn-off energy	E_{off}	V_{DS} = 800 V, I_D = 12.9 A, V_{GS} = 0 to 18 V, R_G = 5 Ω		50		µJ
		V_{DS} = 800 V, I_D = 12.9 A, V_{GS} = 0 to 18 V, R_G = 5 Ω, T_J = 175°C		55		

2 MOSFET body diode

Table 5 Maximum ratings

Description	Symbol	Condition	Values	Unit
Drain-source voltage	V_{DSS}	$T_J \geq 25°C$	1200	V
Peak reverse drain current, t_p limited by $T_{J.max}$	I_{SM}	$V_{GS} = 0$ V	29	A

Table 6 Electrical characteristics

($T_J = 25°C$ if not stated otherwise)

Description	Symbol	Condition	Values			Unit
			Min.	Typ.	Max.	
Drain-source reverse voltage	V_{SD}	$I_{SD} = 12.9$ A, $V_{GS} = 0$ V		4.2	5.5	V
		$I_{SD} = 12.9$ A, $V_{GS} = 0$ V, $T_J = 175°C$		4.05		
MOSFET reverse recovery charge	Q_{rr}	$V_{DS} = 800$ V, $I_{SD} = 12.9$ A, $V_{GS} = 0$ V, di/dt = 1000 A/µs, Q_{rr} includes Q_C		0.27		µC
		$V_{DS} = 800$ V, $I_{SD} = 12.9$ A, $V_{GS} = 0$ V, di/dt = 1000 A/µs, Q_{rr} includes Q_C, $T_J = 175°C$		0.29		
MOSFET peak reverse recovery current	I_{rrm}	$V_{DS} = 800$ V, $I_{SD} = 12.9$ A, $V_{GS} = 0$ V, di/dt = 1000 A/µs, Q_{rr} includes Q_C		20		A
		$V_{DS} = 800$ V, $I_{SD} = 12.9$ A, $V_{GS} = 0$ V, di/dt = 1000 A/µs, Q_{rr} includes Q_C, $T_J = 175°C$		21.3		
MOSFET reverse recovery energy	E_{rr}	$V_{DS} = 800$ V, $I_{SD} = 12.9$ A, $V_{GS} = 0$ V, di/dt = 1000 A/µs, Q_{rr} includes Q_C		110		µJ
		$V_{DS} = 800$ V, $I_{SD} = 12.9$ A, $V_{GS} = 0$ V, di/dt = 1000 A/µs, Q_{rr} includes Q_C, $T_J = 175°C$		120		

3 Package

Table 7 Characteristics and ratings

Description	Symbol	Condition	Values			Unit
			Min.	Typ.	Max.	
Storage temperature	T_{stg}		-40		125	°C
Thermal resistance, junction-case per switch	$R_{th(j-c)}$				1.08	K/W
Isolation voltage	V_{ISO}	1 min., RMS, f = 50 Hz	3.5			kV
Clearance distance		Pin to pin	2.4			mm
		Pin to flat heatsink	3.3			
Creepage distance		Pin to pin	5.5			
		Pin to DCB	12.12			
Comparative tracking index	CTI		600			V
Mounting torque		M3 SEMS screw	0.39	0.68	0.98	Nm
DCB flatness			0		120	µm
Weight				13.8		g

4 Thermistor

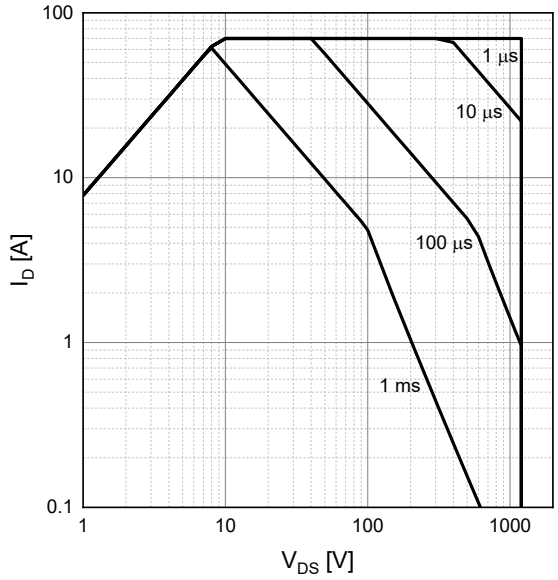
Table 8 Characteristic values

Description	Symbol	Condition	Values			Unit
			Min.	Typ.	Max.	
Resistance	R_{25}	T = 25°C		10		kΩ
Tolerance			-2		2	%
Resistance	R_{100}	T = 100°C		674.4		Ω
Tolerance			-4.75		4.75	%
B-constant	B(25/50)	T = 25°C to 50°C		3946		K
	B(25/85)	T = 25°C to 85°C		3988		
	B(25/100)	T = 25°C to 100°C		4000		
Operating temperature range	T_{NTC}		-40		150	°C

5 Characteristics diagrams

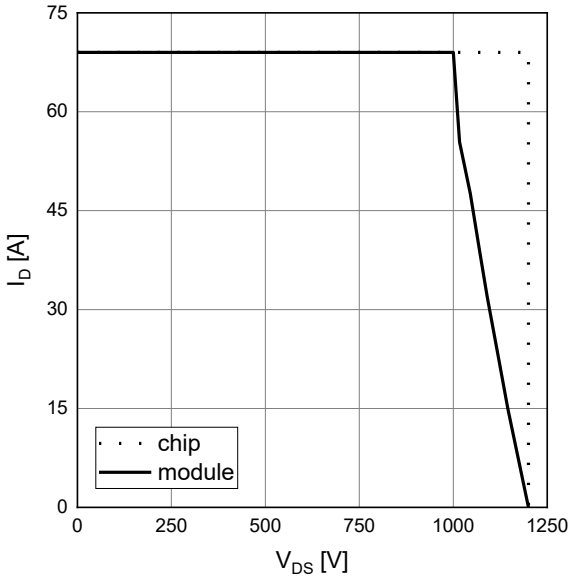
Forward bias safe operating area (FBSOA)

$I_D = f(V_{DS})$, $T_C = 25°C$, D = 0, parameter: t_p



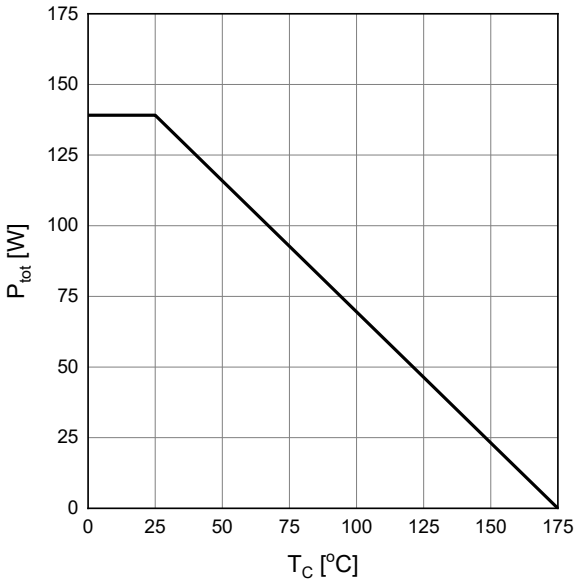
Reverse bias safe operating area (RBSOA)

$I_D = f(V_{DS})$, V_{GS} = 0/18 V, $T_J \leq 175°C$, $T_C = 25°C$



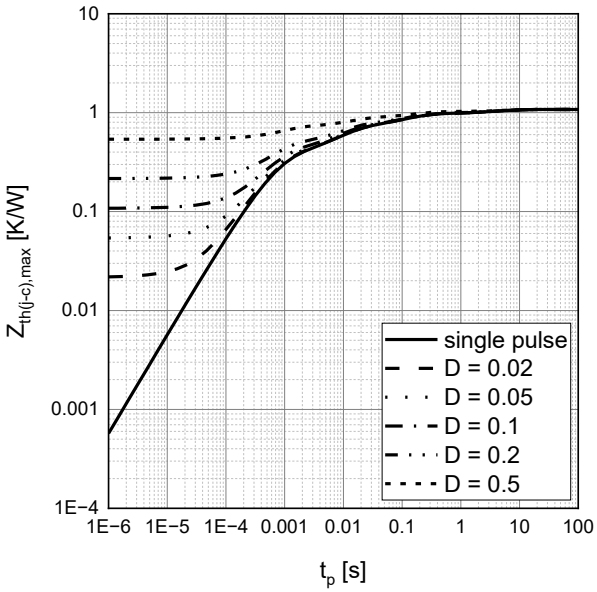
Power dissipation

$P_{tot} = f(T_C)$



Max. transient thermal impedance

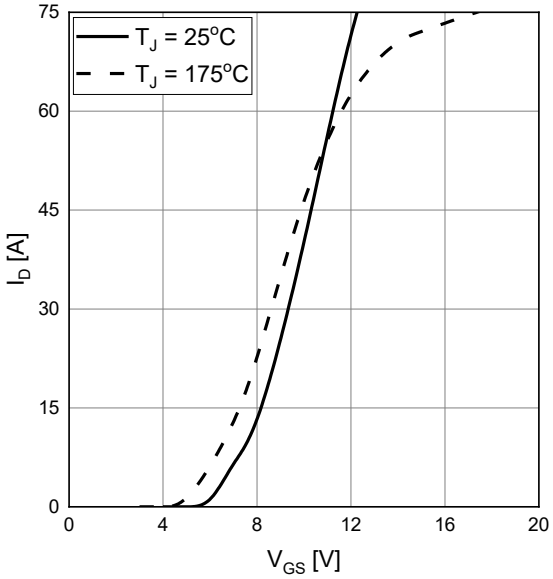
$Z_{th(j-c),max} = f(t_p)$, $D = t_p/T$



Characteristics diagrams

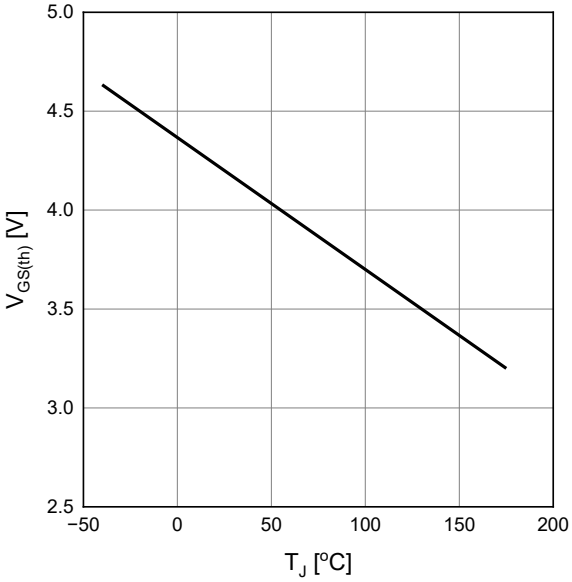
Typical transfer characteristics

$I_{DS} = f(V_{GS})$, V_{DS} = 20 V



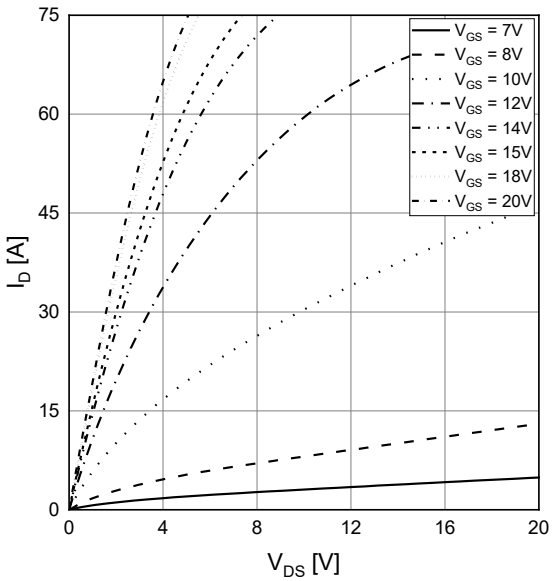
Typical gate-source threshold voltage vs junction temperature

$V_{GS(th)} = f(T_J)$, I_D = 4.1 mA



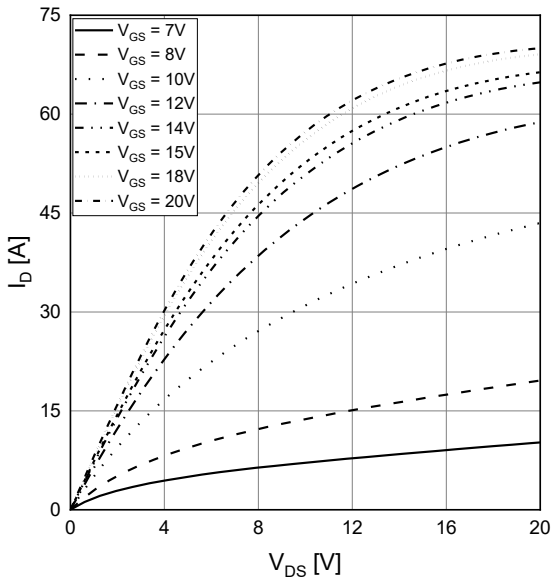
Typical output characteristics

$I_D = f(V_{DS})$, T_J = 25°C



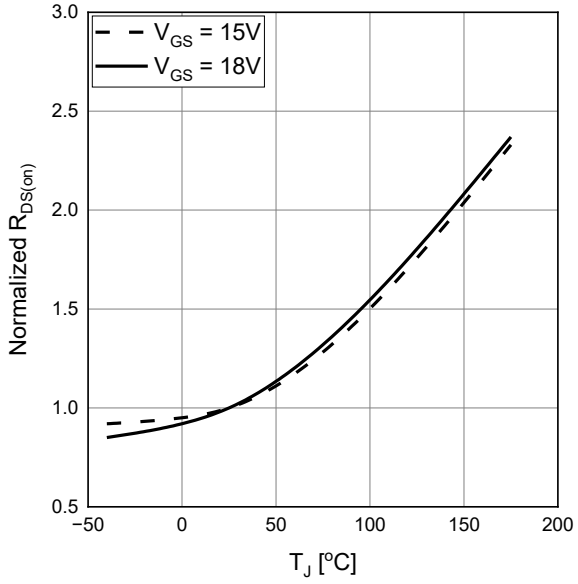
Typical output characteristics

$I_D = f(V_{DS})$, T_J = 175°C



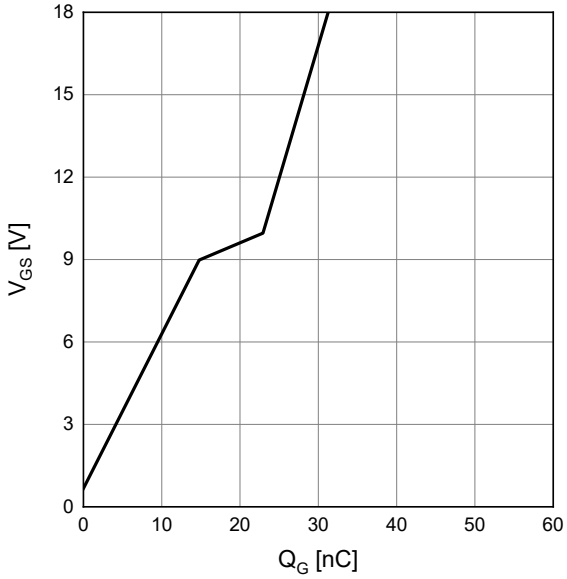
Typical on-state resistance vs junction temperature

$R_{DS(on)} = f(T_J)$, $I_D = 12.9$ A



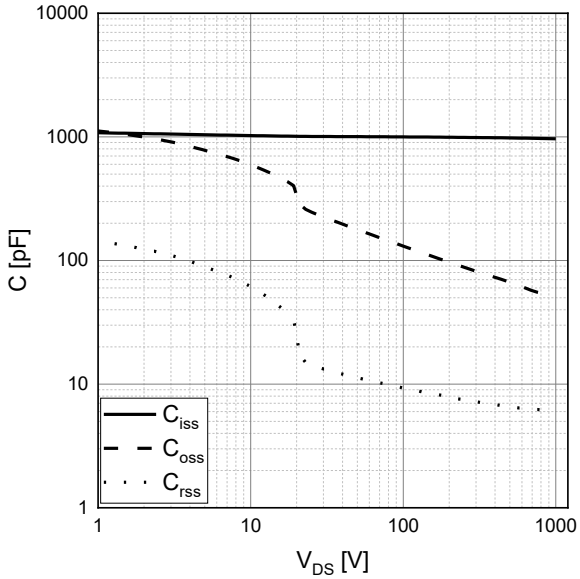
Typical gate charge

$V_{GS} = f(Q_G)$, $I_D = 12.9$ A, $V_{DS} = 800$ V



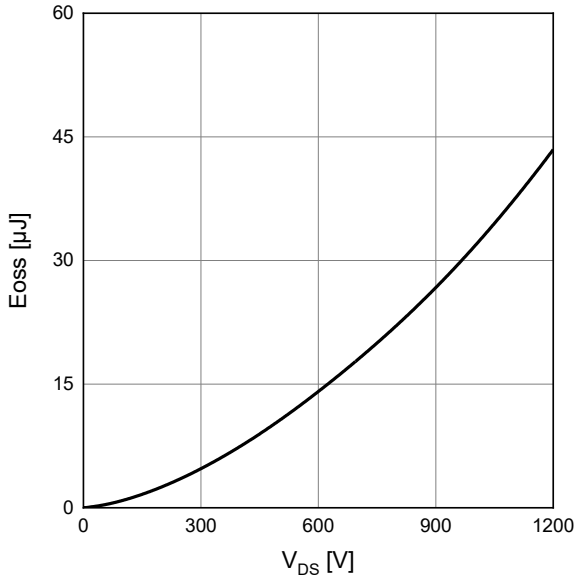
Typical capacitance vs drain-source voltage

$C = f(V_{DS})$, $f = 100$ kHz, $V_{GS} = 0$ V



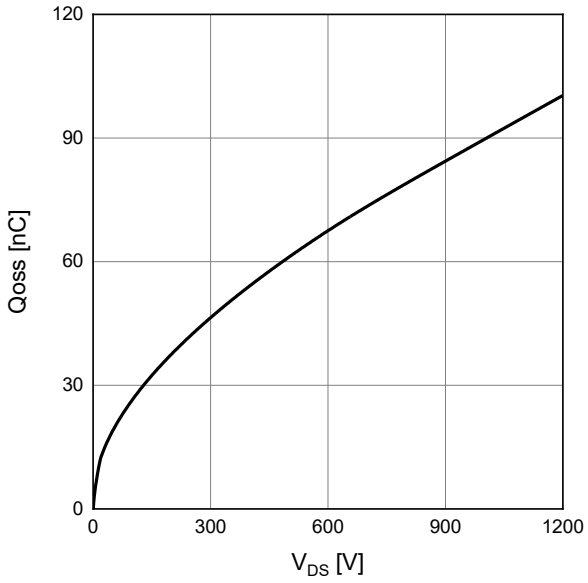
Typical Coss stored energy

$E = f(V_{DS})$



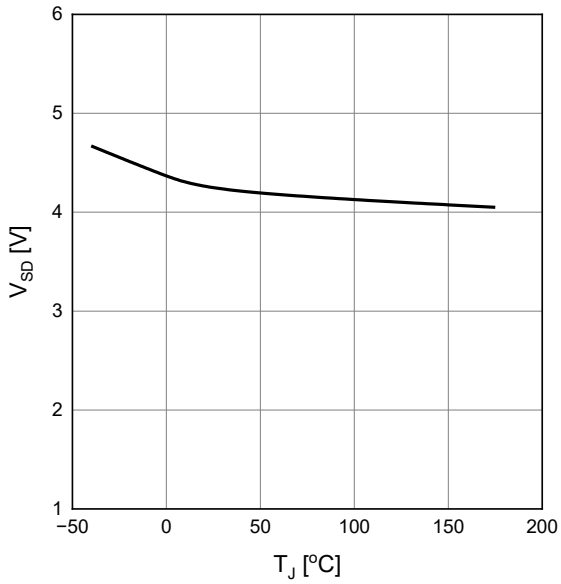
Typical Coss stored charge

$Q = f(V_{DS})$



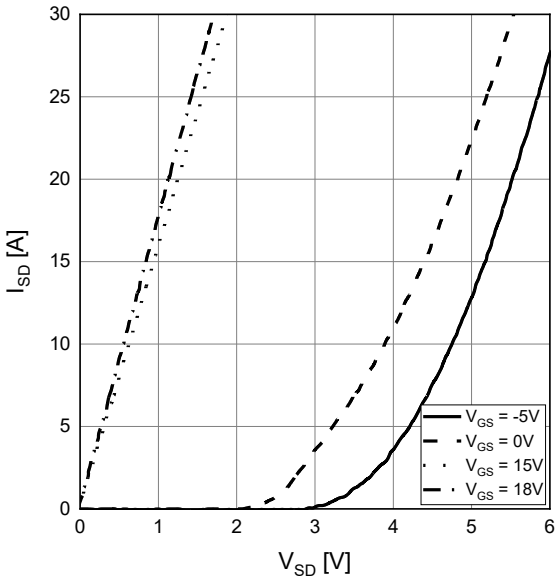
Typical reverse drain voltage characteristics

$V_{SD} = f(T_J)$, I_{SD} = 12.9 A, V_{GS} = 0 V



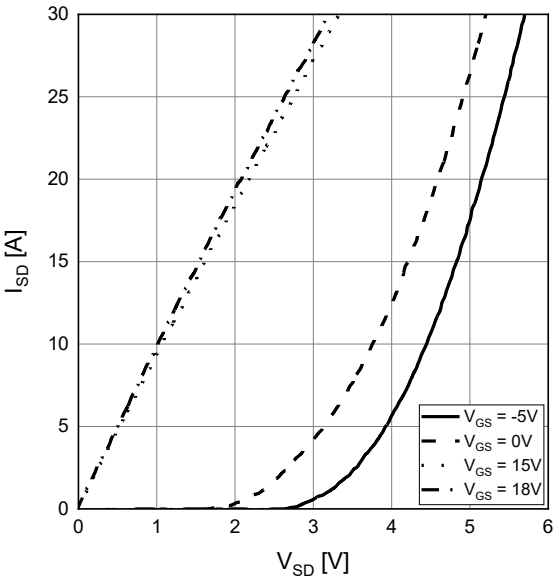
Typical reverse drain current characteristics

$I_{SD} = f(V_{SD})$, T_J = 25°C



Typical reverse drain current characteristics

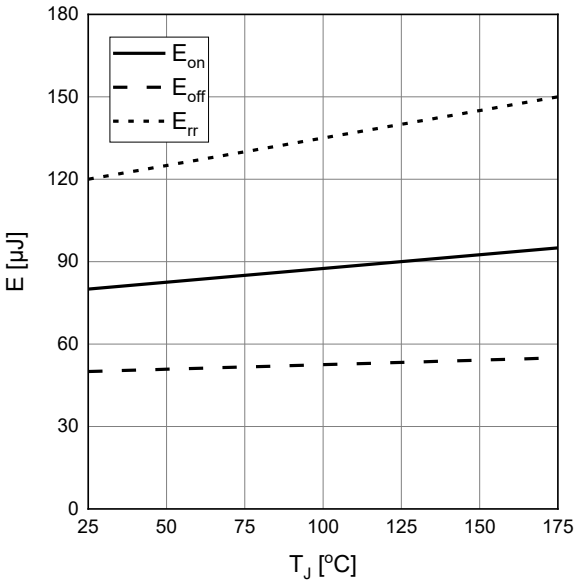
$I_{SD} = f(V_{SD})$, T_J = 175°C



Characteristics diagrams

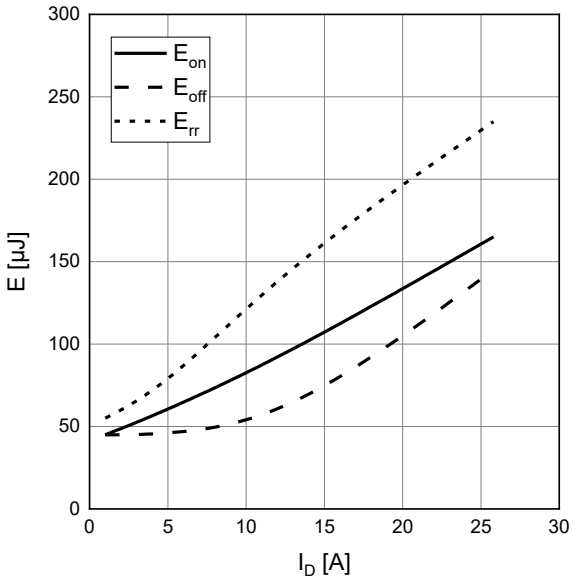
Typical switching losses vs junction temperature

$E = f(T_J)$, V_{GS} = 0/18 V, I_D = 12.9 A, $R_{G,ext}$ = 5 Ω, V_{DS} = 800 V



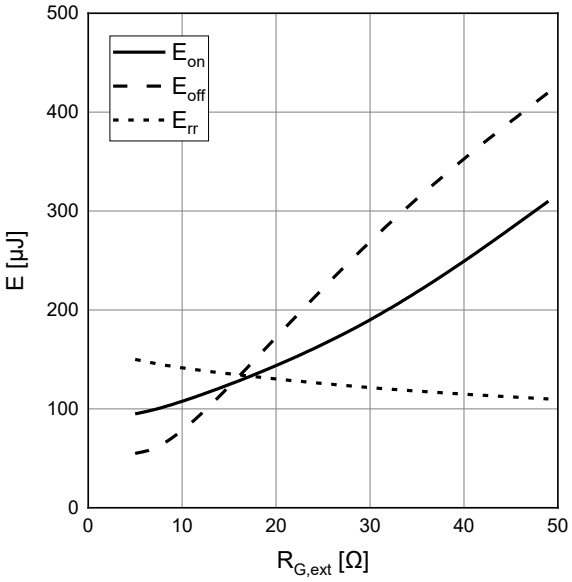
Typical switching losses vs drain current

$E = f(I_D)$, V_{GS} = 0/18 V, T_J = 175°C, $R_{G,ext}$ = 5 Ω, V_{DS} = 800 V



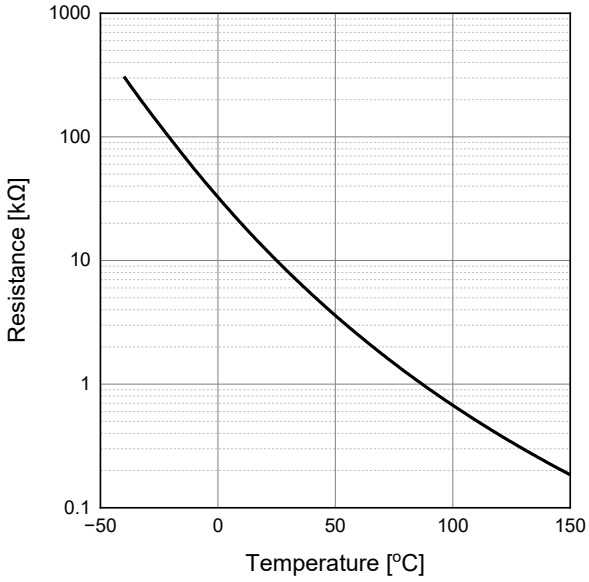
Typical switching losses vs gate resistance

$E = f(R_{G,ext})$, V_{GS} = 0/18 V, T_J = 175°C, I_D = 12.9 A, V_{DS} = 800 V

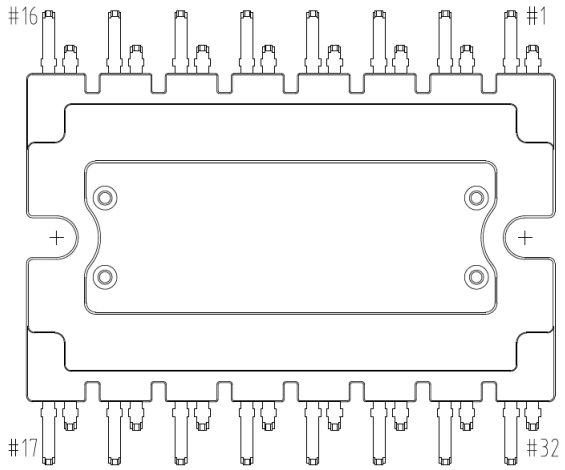


NTC thermistor characteristics

$R = f(T_{NTC})$



6 Pin description



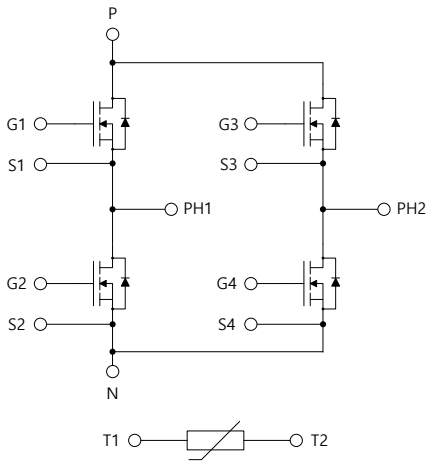


Figure 1 Pin-out (bottom view)

Table 9 Pin description

Pin number	Description	Pin number	Description
1	N	17	NC
2	N	18	NC
3	NC	19	G3
4	NC	20	S3
5	PH1	21	G4
6	PH1	22	S4
7	NC	23	NC
8	NC	24	NC
9	PH2	25	NC
10	PH2	26	NC
11	NC	27	S1
12	NC	28	G1
13	T2	29	S2
14	T1	30	G2
15	P	31	NC
16	P	32	NC

7 Package outline

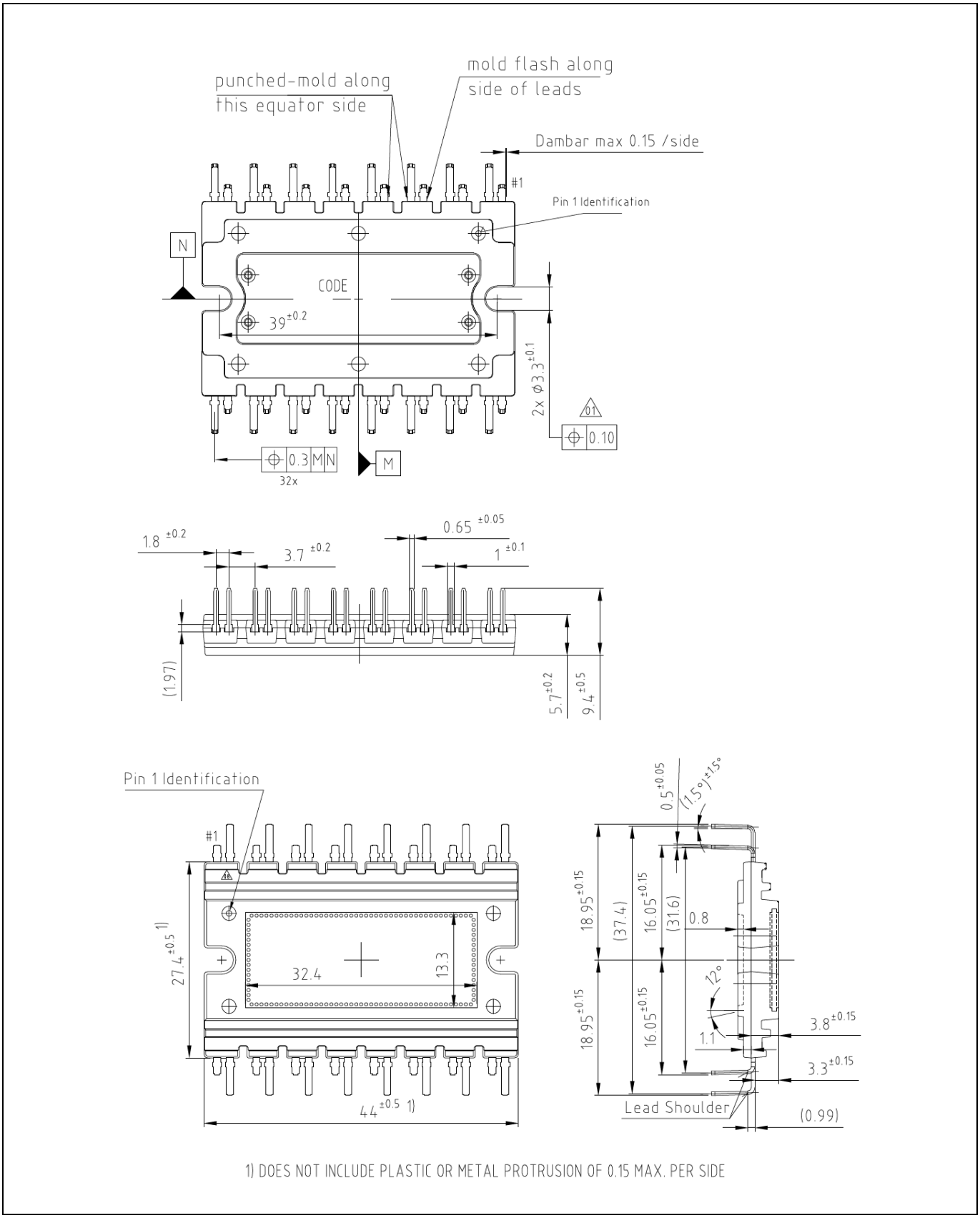


Figure 2 AMF12S54LB2Z

Revision history

Document version	Date of release	Description of changes
2.0	2026-01-30	Initial release

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