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Automotive MOSFET

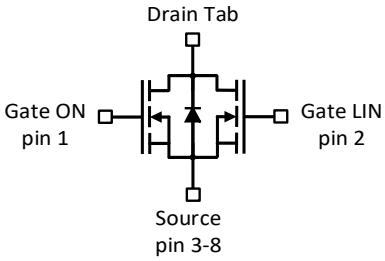
OptiMOS™ 5 Power-Transistor

RoHS | Infineon Automotive Quality | AEC Qualified

PG-HSOF-8-2

Features

- OptiMOS™ power MOSFET for automotive applications
- N-channel – Enhancement mode – Normal Level
- Extended qualification beyond AEC-Q101
- Enhanced electrical testing
- Robust design
- Linear FET (LINFET) and low $R_{DS(on)}$ FET (ONFET) in one package
- Dedicated gate pins for both MOSFETs (Dual Gate)
- Linear FET with enhanced SOA and paralleling characteristics for linear operation
- 175°C operating temperature
- RoHS compliant
- 100% Avalanche tested
- MSL1 up to 260°C peak reflow



Potential applications

- Power distribution and battery management (electronic fuses and disconnect switches)
- In-rush current limitation (capacitor charging, motor surge current)
- Slow switching to minimize voltage transients and EMI (electrical catalyst heater)
- Drain-source voltage clamping (dissipation of inductive energy, over-voltage protection)

Product validation

Qualified for automotive applications. Product validation according to AEC-Q101.

Product summary

V_{DS}	80	V
$R_{DS(on),max}$	1.15	mΩ
I_D (chip limited)	410	A

Type	Package	Marking
IAUTN08S5N012L	PG-HSOF-8-2	5N0812L

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Maximum ratings

at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Drain current	I_D	$V_{GS,LIN} = V_{GS,ON}$ = 10 V, T_c = 25 °C, chip limitation[1,2)]	410	A
		$V_{GS,LIN} = V_{GS,ON}$ = 10 V, T_c = 25 °C, DC current[3)]	300	
		$V_{GS,LIN} = V_{GS,ON}$ = 10 V, T_c = 85 °C, R_{thja} on 2s2p[2,4)]	52	
Pulsed drain current	$I_{D,pulse}$	$V_{GS,LIN} = V_{GS,ON}$ = 10 V, T_c = 25 °C, t_p = 100 µs[2)]	1505	
Avalanche energy, single pulse[2)]	E_{AS}	I_D = 150 A	820	mJ
Avalanche current, single pulse	I_{AS}	–	300	A
Gate source voltage, LINFET	$V_{GS,LIN}$	–	± 20	V
Gate source voltage, ONFET	$V_{GS,ON}$	–	± 20	V
Power dissipation	P_{tot}	T_C = 25 °C, $V_{GS,LIN} = V_{GS,ON}$ = 10 V	375	W
Operating and storage temperature	T_j, T_{stg}	–	-55 ... +175	°C

Thermal characteristics[2)]

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Thermal resistance, junction - case	R_{thJC}	–	–	–	0.40	K/W
Thermal resistance, junction - ambient[3)]	R_{thJA}	–	–	14.8	–	

Electrical characteristics

at T_j=25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Static characteristics						
Drain-source breakdown voltage	$V_{(Br)DSS}$	$V_{GS,ON} = V_{GS,LIN} = 0$ V, $I_D = 1$ mA	80	–	–	V
Current limit precision	$I_{D(lim)}$	$V_{DS} = 6$ V, $V_{GS,ON} = 0$ V, $V_{GS,LIN} = 5.6$ V	15	39	57	A
		$V_{DS} = 6$ V, $V_{GS,ON} = 0$ V, $V_{GS,LIN} = 6.2$ V	35	65	87	A
		$V_{DS} = 48$ V, $V_{GS,ON} = 0$ V, $V_{GS,LIN} = 5.6$ V	25	48	66	A
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS,LIN}$, $V_{GS,ON} = 0$ V, $I_D = 22$ µA	2.5	2.9	3.3	V
		$V_{DS} = V_{GS,ON} = V_{GS,LIN}$, $I_D = 275$ µA	2.5	2.9	3.3	
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 80$ V, Tj = 25 °C, $V_{GS,ON} = V_{GS,LIN} = 0$ V	–	–	1	µA
		$V_{DS} = 50$ V, Tj = 85 °C, $V_{GS,ON} = V_{GS,LIN} = 0$ V[2)]	–	–	20	
Gate-source leakage current LINFET	$I_{GSS,LIN}$	$V_{GS,LIN} = 20$ V	–	–	100	nA
Gate-source leakage current ONFET	$I_{GSS,ON}$	$V_{GS,ON} = 20$ V	–	–	100	
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS,ON} = V_{GS,LIN} = 6$ V, $I_D = 75$ A	–	1.30	1.80	mΩ
		$V_{GS,ON} = V_{GS,LIN} = 10$ V, $I_D = 100$ A	–	1.00	1.15	
		$V_{GS,ON} = 0$ V, $V_{GS,LIN} = 6$ V, $I_D = 3.75$ A	–	11.0	16.0	
		$V_{GS,ON} = 0$ V, $V_{GS,LIN} = 10$ V, $I_D = 5$ A	–	6.0	9.0	

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic characteristics[2]						
Input capacitance ON- and LINFET	$C_{iss,ON+LIN}$	$V_{GS,ON} = V_{GS,LIN} = 0$ V, $V_{DS} = 40$ V, $f = 1$ MHz, refers to pins Gate ON and Gate LIN short-circuited	–	11800	15340	pF
Output capacitance ON- and LINFET	$C_{oss,ON+LIN}$		–	2100	2730	
Reverse transfer capacitance ON- and LINFET	$C_{rss,ON+LIN}$		–	91	137	
Input capacitance LINFET	$C_{iss,LIN}$	$V_{GS,ON} = V_{GS,LIN} = 0$ V, $V_{DS} = 40$ V, $f = 1$ MHz, refers to pin Gate LIN	–	1200	1560	
Output capacitance LINFET	$C_{oss,LIN}$		–	2100	2730	
Reverse transfer capacitance LINFET	$C_{rss,LIN}$		–	16	24	
Gate charge characteristics[2]						
Gate to source charge ON- and LINFET	$Q_{gs,ON+LIN}$	$V_{DD} = 40$ V, $I_D = 100$ A, $V_{GS,ON} = V_{GS,LIN} = 0$ to 10 V	–	51	66	nC
Gate to drain charge ON- and LINFET	$Q_{gd,ON+LIN}$		–	44	66	
Gate charge total ON- and LINFET	$Q_{g,ON+LIN}$		–	178	231	
Gate to source charge LINFET	$Q_{gs,LIN}$	$V_{DD} = 40$ V, $I_D = 5$ A, $V_{GS,LIN} = 0$ to 10 V, $V_{GS,ON} = 0$ V	–	5.2	6.8	
Gate to drain charge LINFET	$Q_{gd,LIN}$		–	4.7	7.1	
Gate charge total LINFET	$Q_{g,LIN}$		–	19	24	
Reverse diode						
Diode continous forward current[2]	I_S	$T_C = 25$ °C	–	–	300	A
Diode pulse current[2]	$I_{S,pulse}$	$T_C = 25$ °C, $t_p = 100$ µs	–	–	1505	
Diode forward voltage	V_{SD}	$I_F = 100$ A, $T_j = 25$ °C	–	0.8	1.1	V
Reverse recovery time[2]	t_{rr}	$V_R = 40$ V, $I_F = 50$ A, $di_F/dt = 100$ A/µs	–	86	–	ns
Reverse recovery charge[2]	Q_{rr}		–	177	–	nC

[1] Current is limited by the overall system design and the customer-specific PCB.

[2] The parameter is not subject to production testing – specified by design.

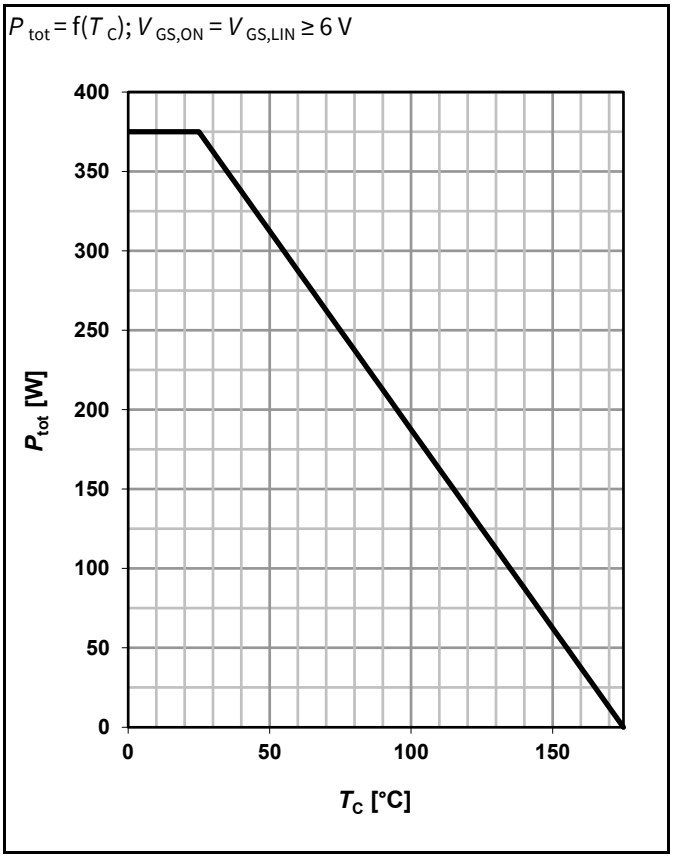
[3] Current is limited by the bond wires.

[4] Device on 2s2p FR4 PCB defined in accordance with JEDEC standards (JESD51-5, -7). PCB is vertical in still air.

Electrical characteristics diagrams

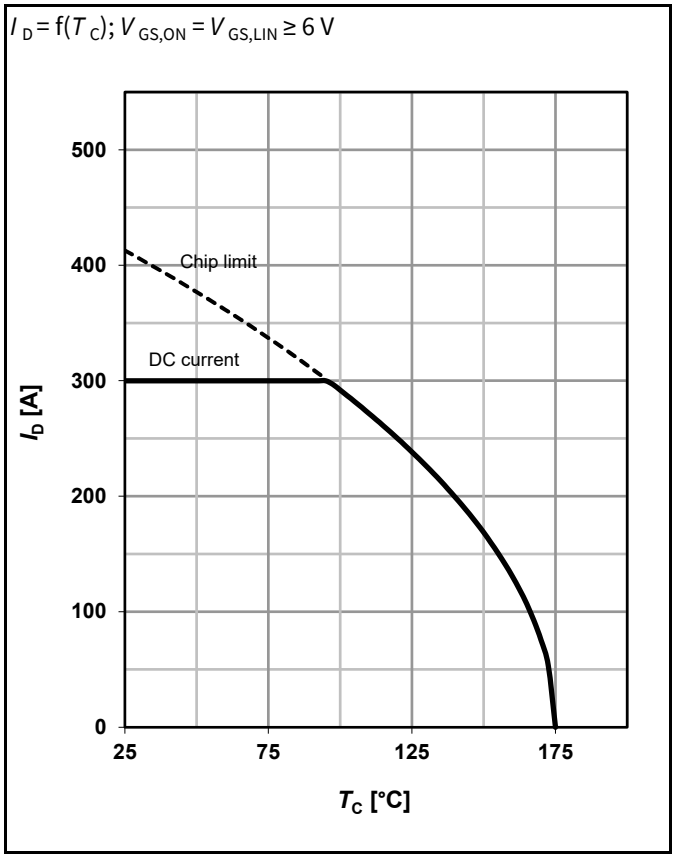
1 Power dissipation

$P_{tot} = f(T_C)$; $V_{GS,ON} = V_{GS,LIN} \geq 6$ V



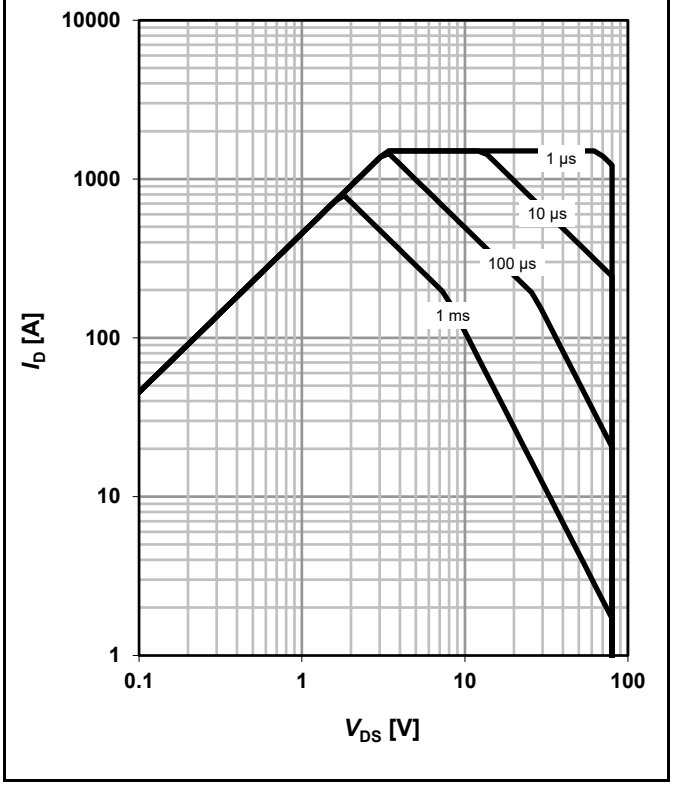
2 Drain current

$I_D = f(T_C)$; $V_{GS,ON} = V_{GS,LIN} \geq 6$ V



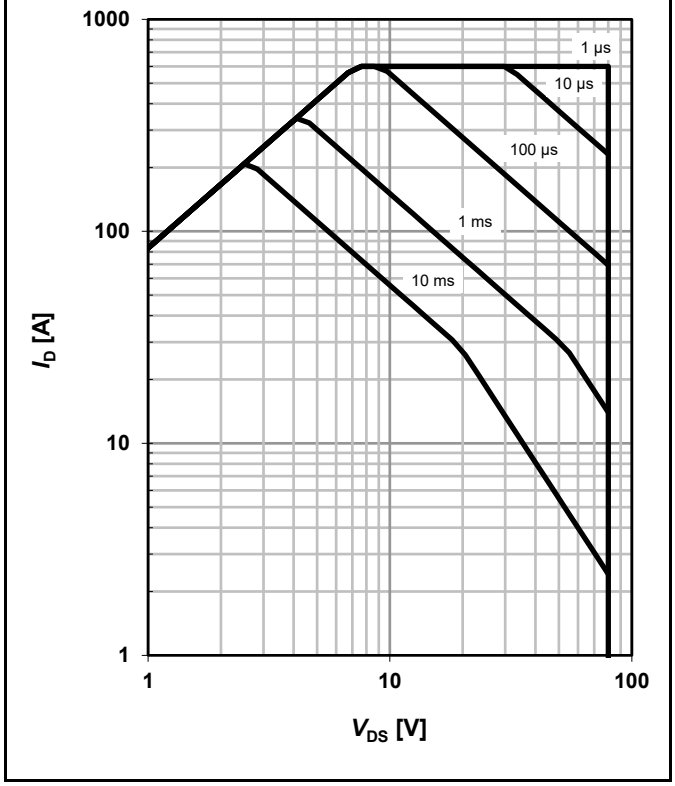
3 Safe operating area ONFET and LINFET

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



4 Safe operating area LINFET

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



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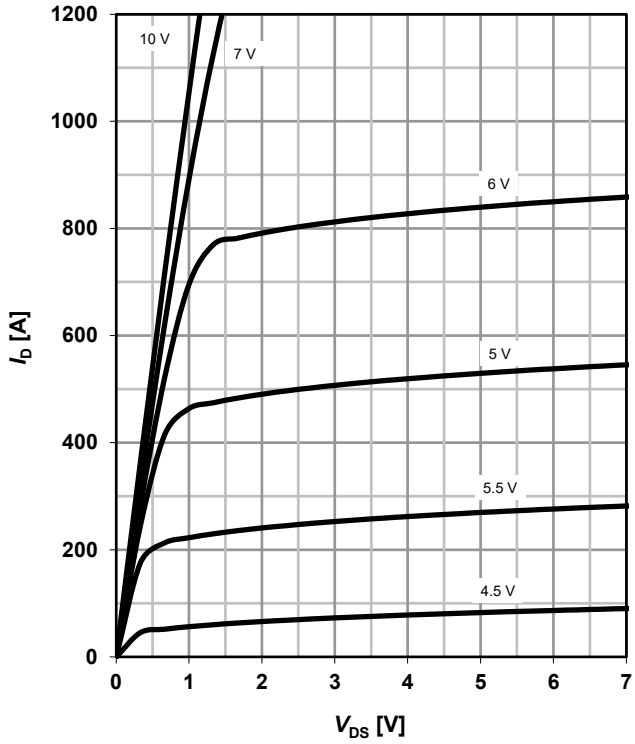
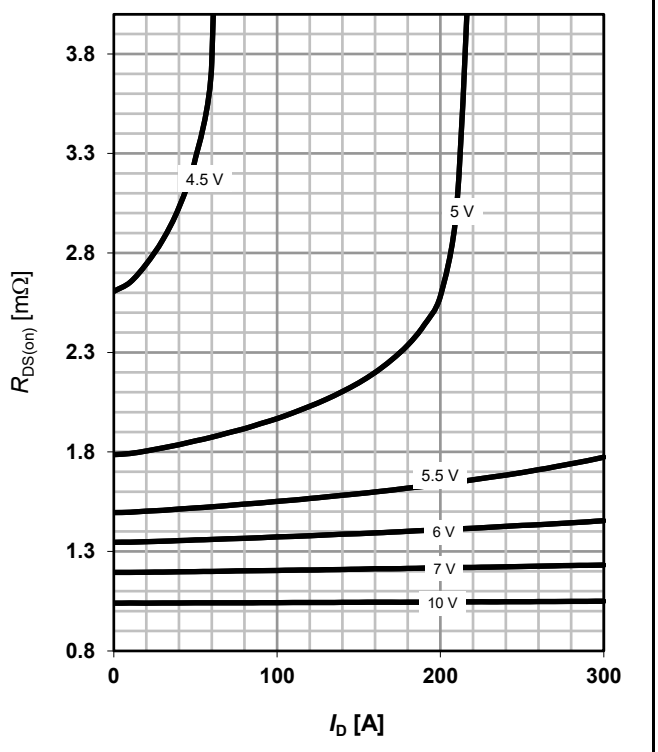
5 Typ. output characteristics ONFET and LINFET

$I_D = f(V_{DS})$; $T_j = 25$ °C; parameter: $V_{GS,ON} = V_{GS,LIN}$



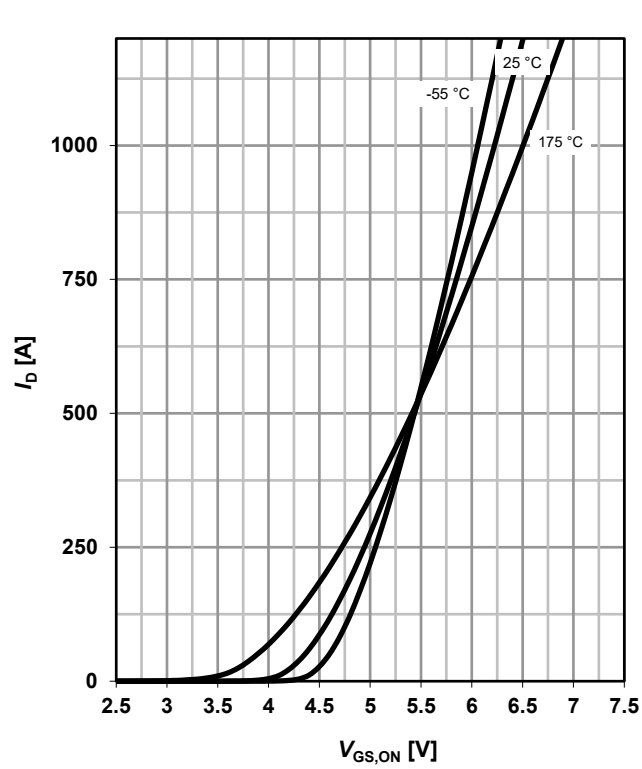
6 Typ. drain-source on-state resistance ONFET and LINFET

$R_{DS(on)} = f(I_D)$; $T_j = 25$ °C; parameter: $V_{GS,ON} = V_{GS,LIN}$



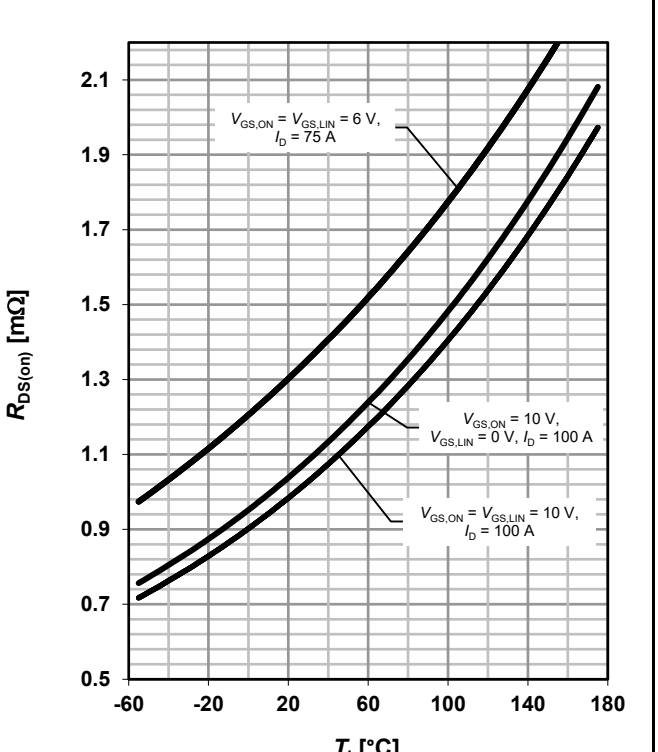
7 Typ. transfer characteristics ONFET and LINFET

$I_D = f(V_{GS,ON})$; $V_{DS} = 6$ V; $V_{GS,ON} = V_{GS,LIN}$; parameter: T_j



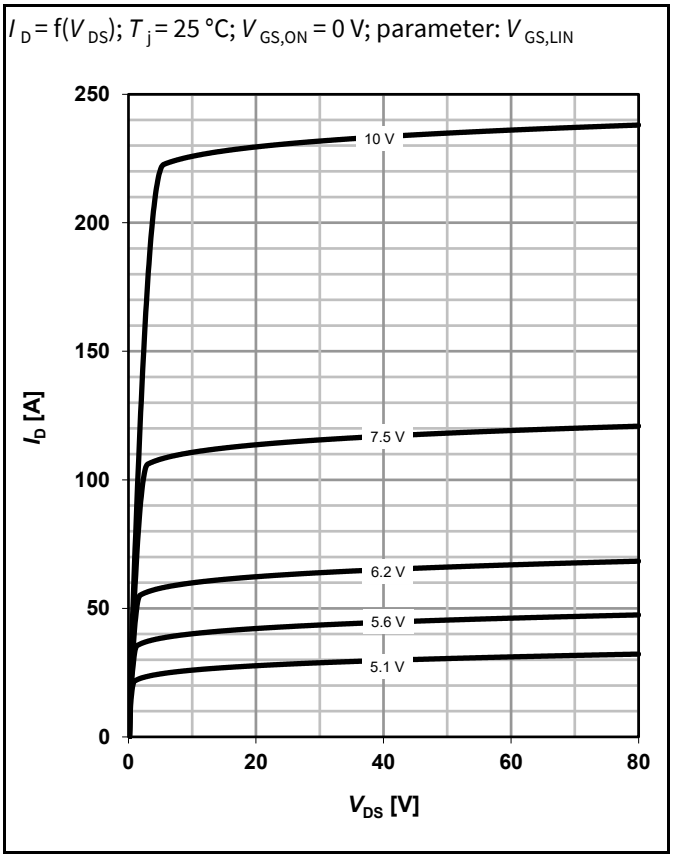
8 Typ. drain-source on-state resistance ONFET and LINFET

$R_{DS(on)} = f(T_j)$; parameter: I_D, $V_{GS,ON}$, $V_{GS,LIN}$



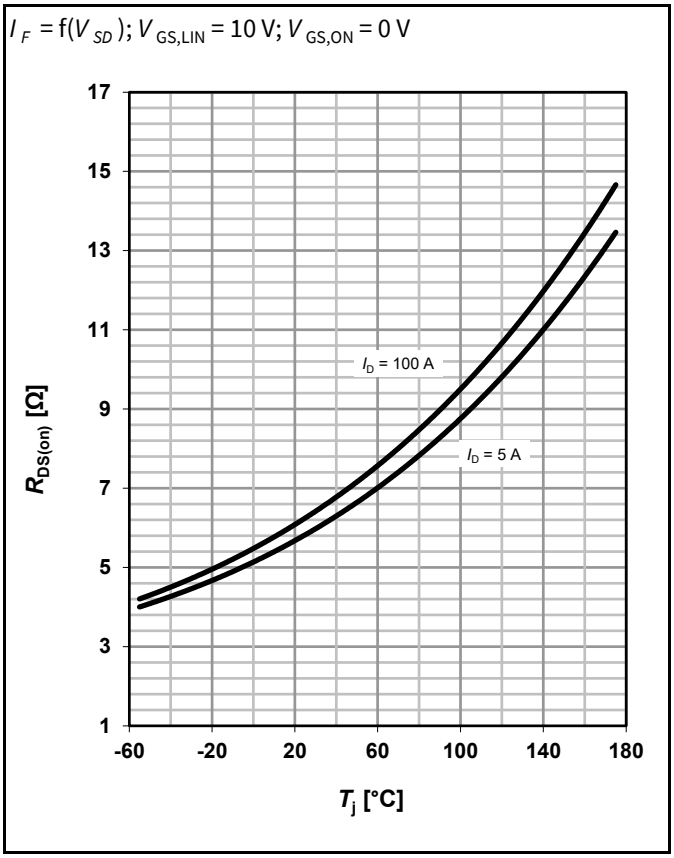
9 Typ. output characteristics LINFET

$I_D = f(V_{DS})$; $T_j = 25$ °C; $V_{GS,ON} = 0$ V; parameter: $V_{GS,LIN}$



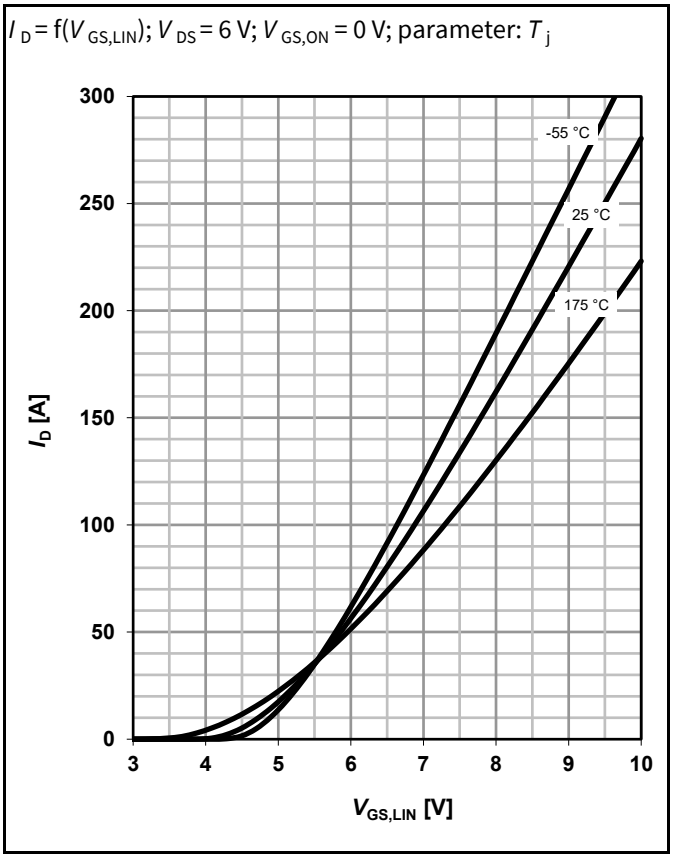
10 Typ. drain-source on-state resistance LINFET

$I_F = f(V_{SD})$; $V_{GS,LIN} = 10$ V; $V_{GS,ON} = 0$ V



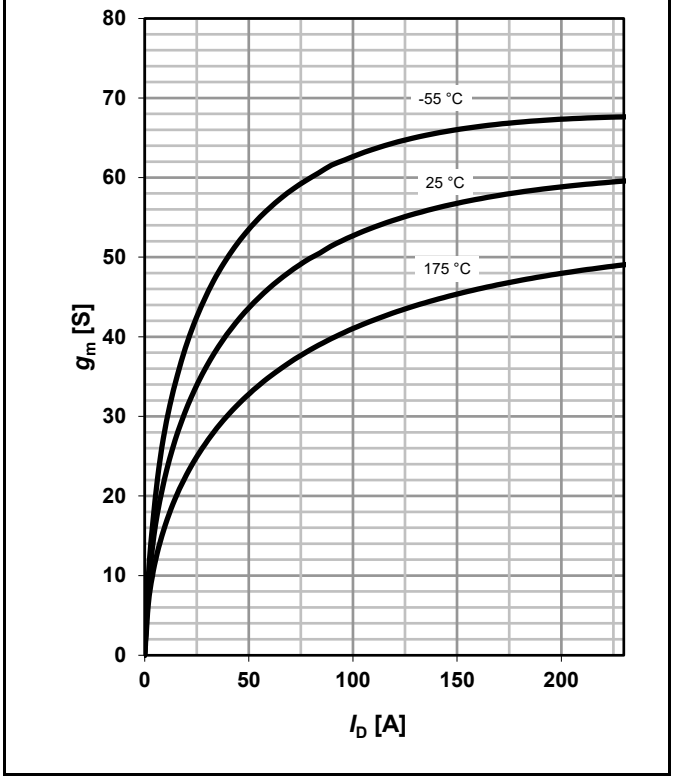
11 Typ. transfer characteristics LINFET

$I_D = f(V_{GS,LIN})$; $V_{DS} = 6$ V; $V_{GS,ON} = 0$ V; parameter: T_j



12 Typ. transconductance LINFET

$g_m = f(I_D)$; $V_{DS} = 6$ V; $V_{GS,ON} = 0$ V; parameter: T_j



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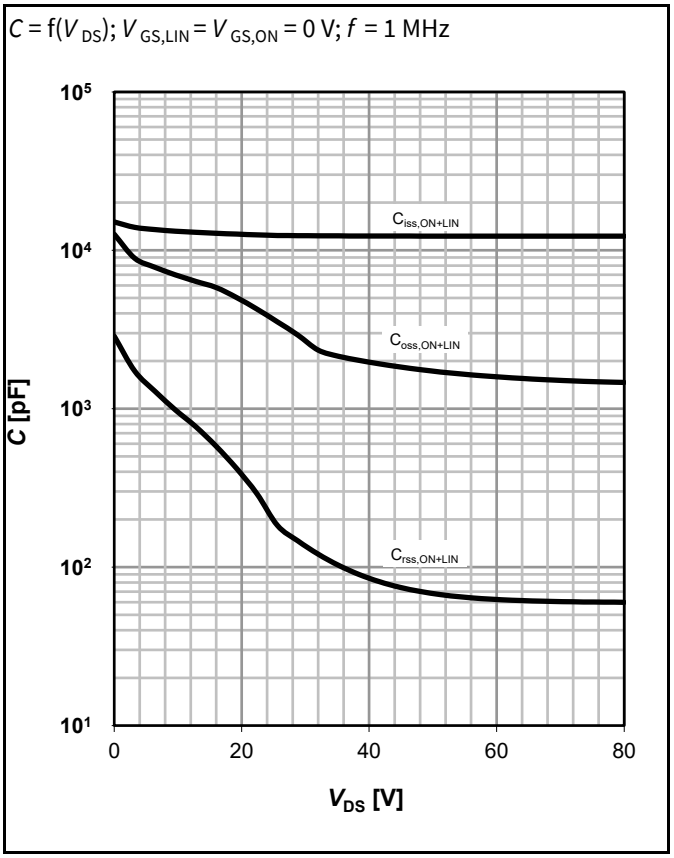
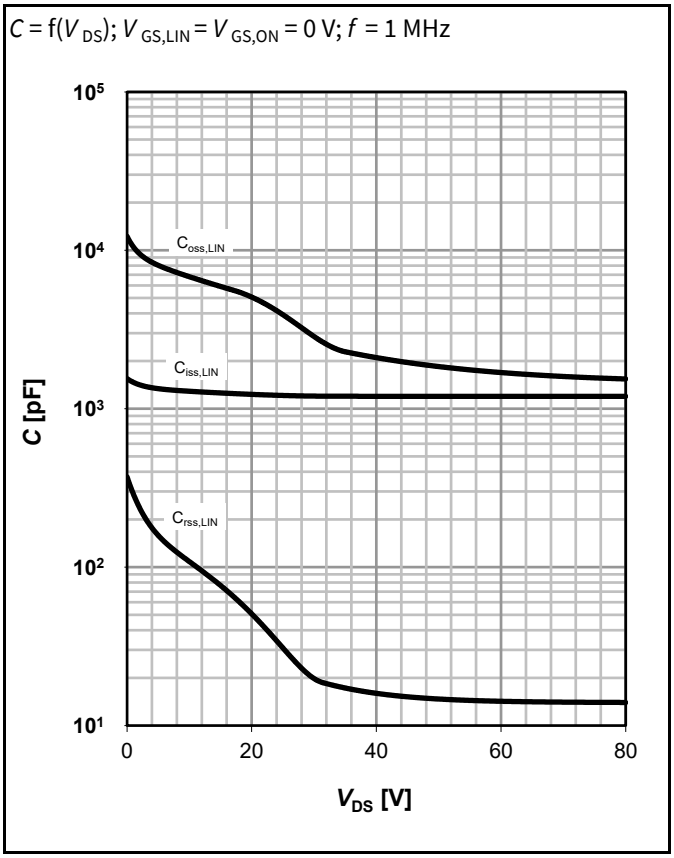
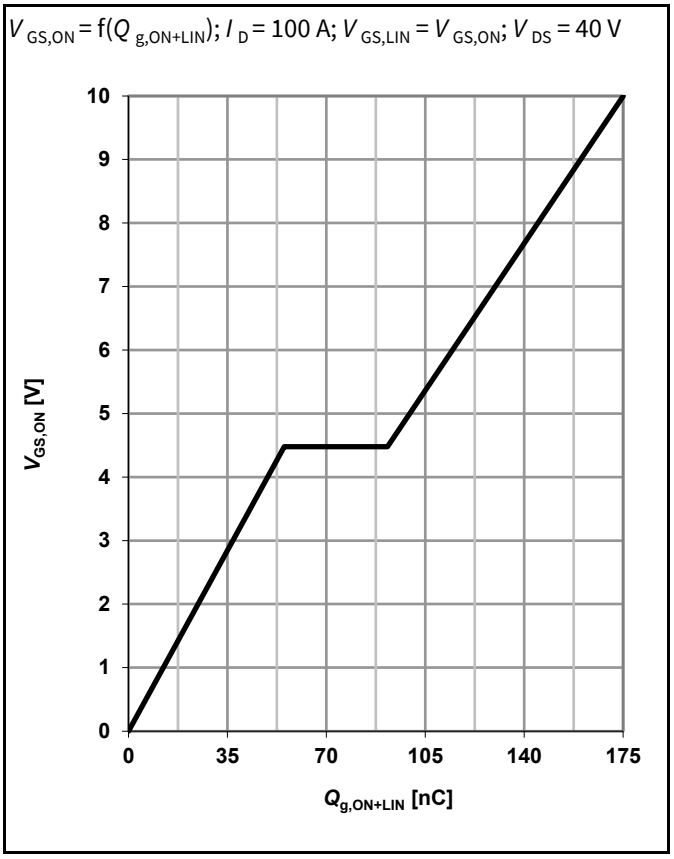
13 Typ. capacitances ONFET and LINFET



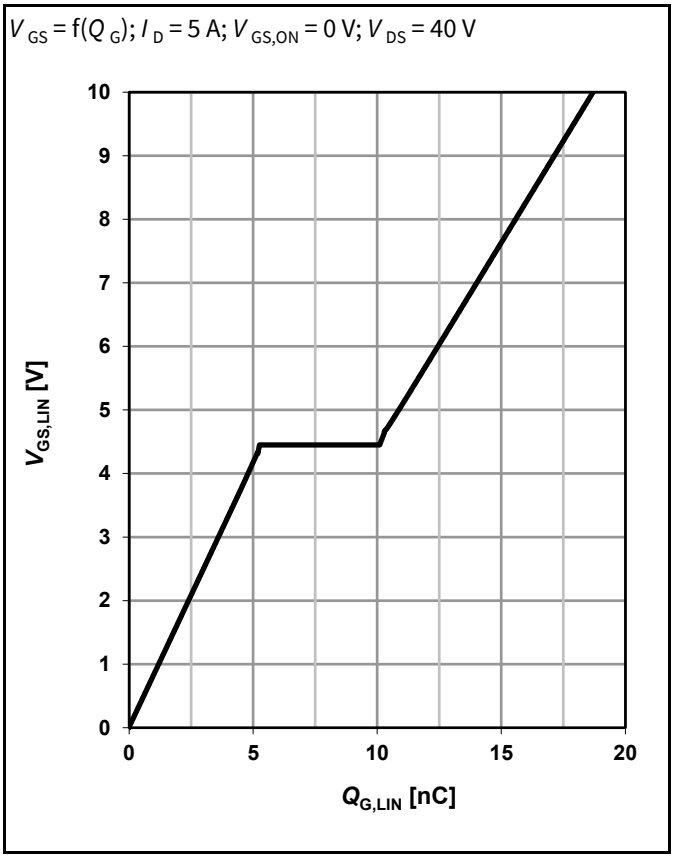
14 Typ. capacitances LINFET



15 Typ. gate charge ONFET and LINFET

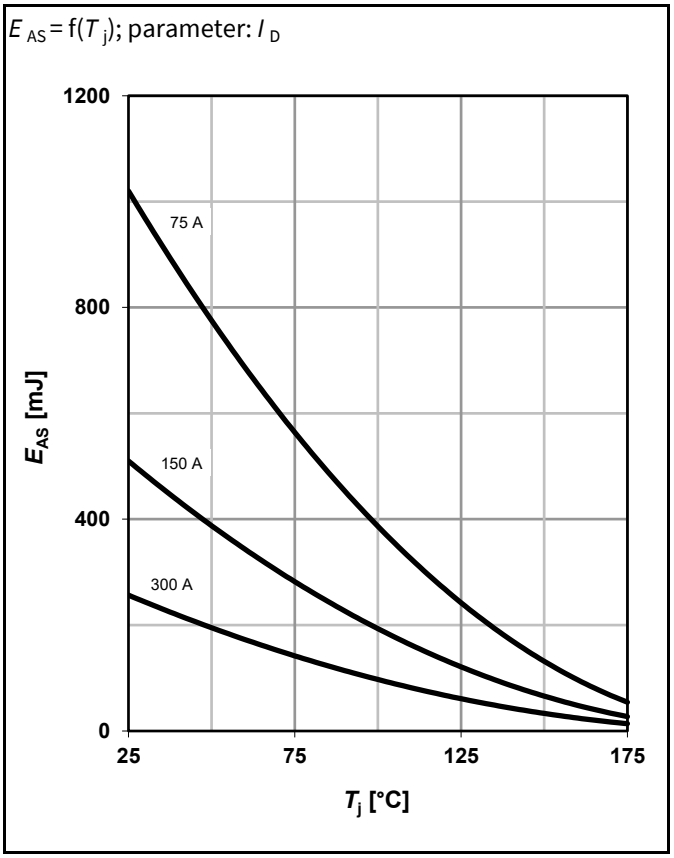


16 Typ. gate charge LINFET



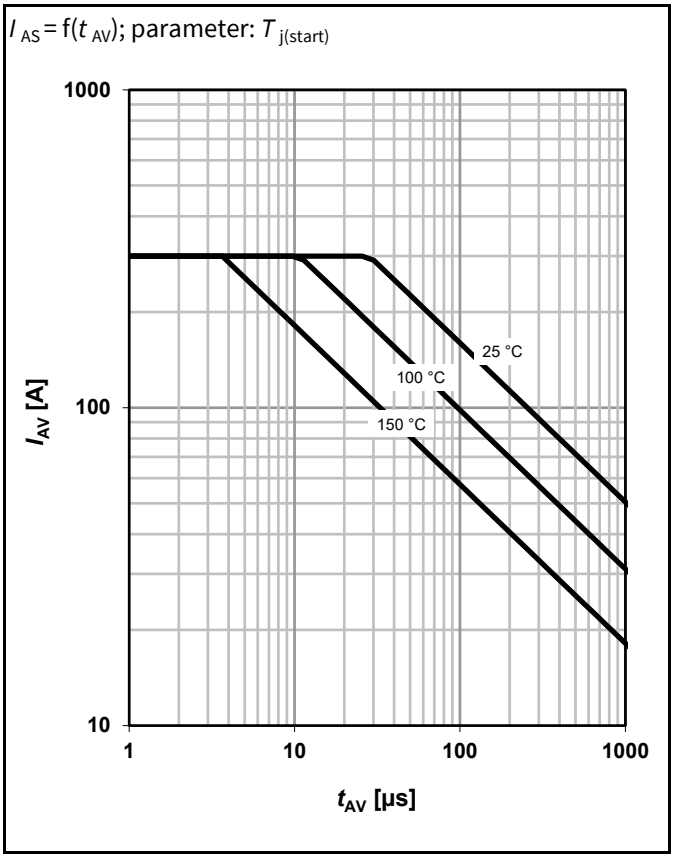
17 Typical avalanche energy

$E_{AS} = f(T_j)$; parameter: I_D



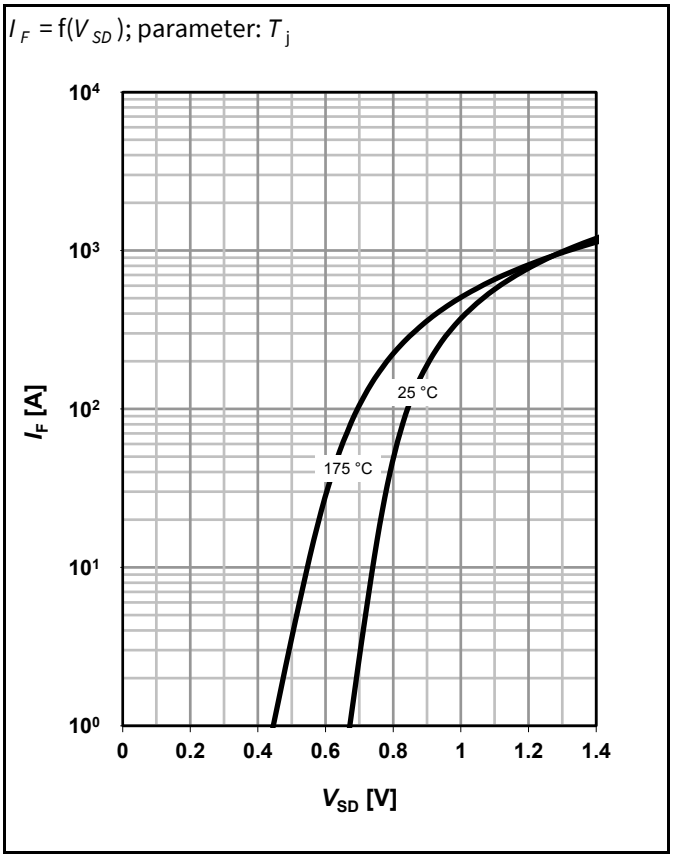
18 Typ. avalanche characteristics

$I_{AS} = f(t_{AV})$; parameter: $T_{j(start)}$



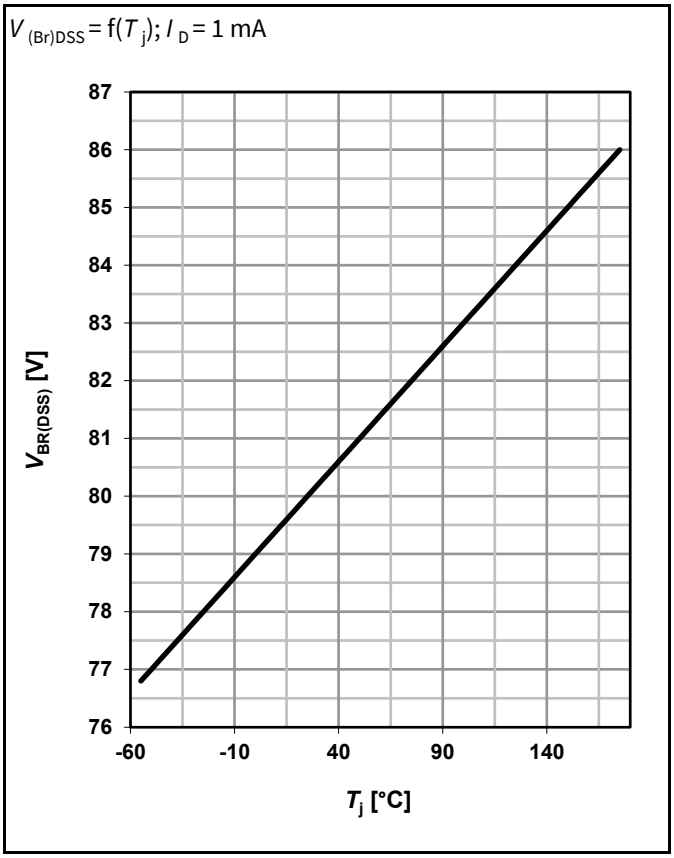
19 Typical forward diode characteristics

$I_F = f(V_{SD})$; parameter: T_j



20 Drain-source breakdown voltage

$V_{(Br)DSS} = f(T_j)$; $I_D = 1$ mA



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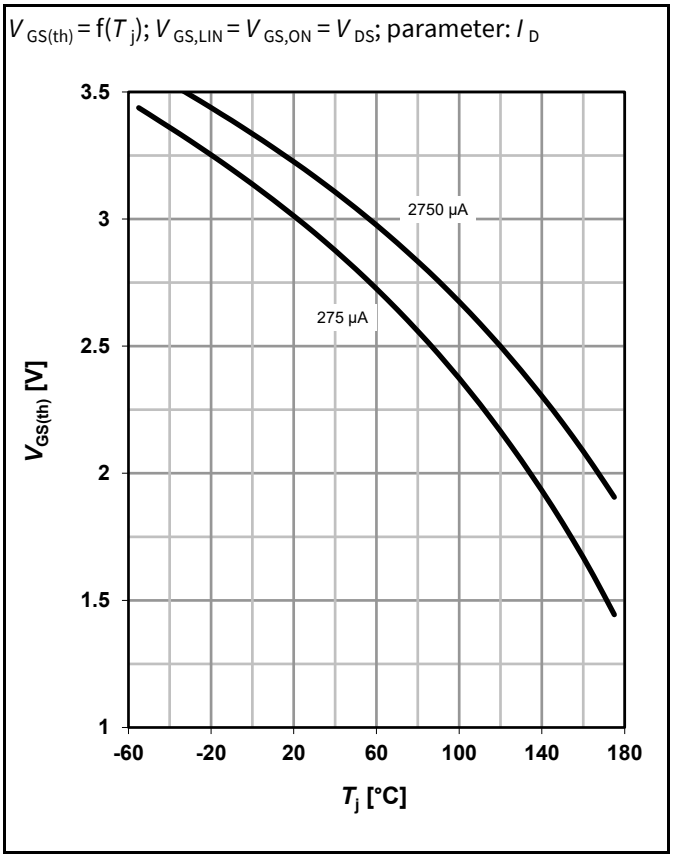
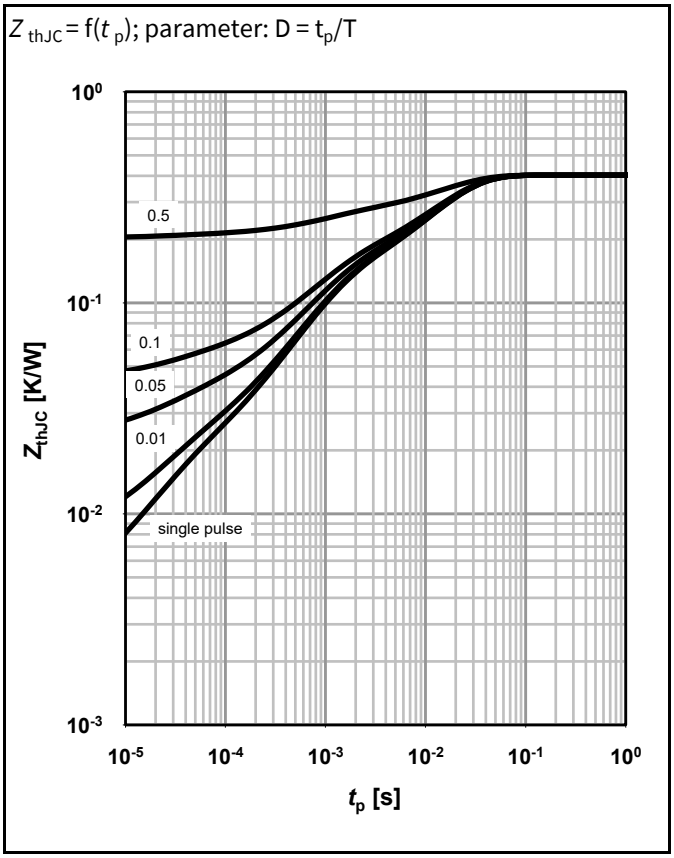
21 Typ. gate threshold voltage ONFET and LINFET

$V_{GS(th)} = f(T_j)$; $V_{GS,LIN} = V_{GS,ON} = V_{DS}$; parameter: I_D

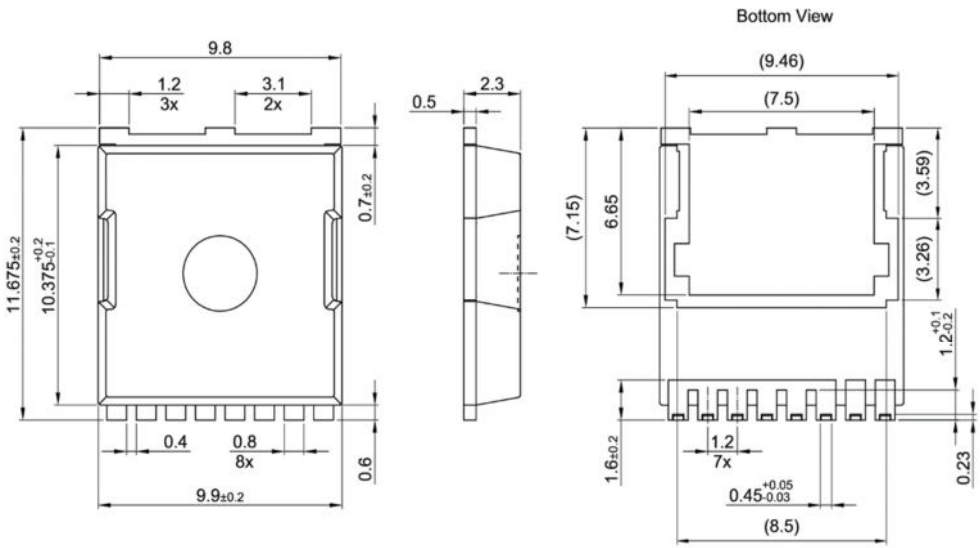


22 Max. transient thermal impedance

$Z_{thJC} = f(t_p)$; parameter: $D = t_p/T$

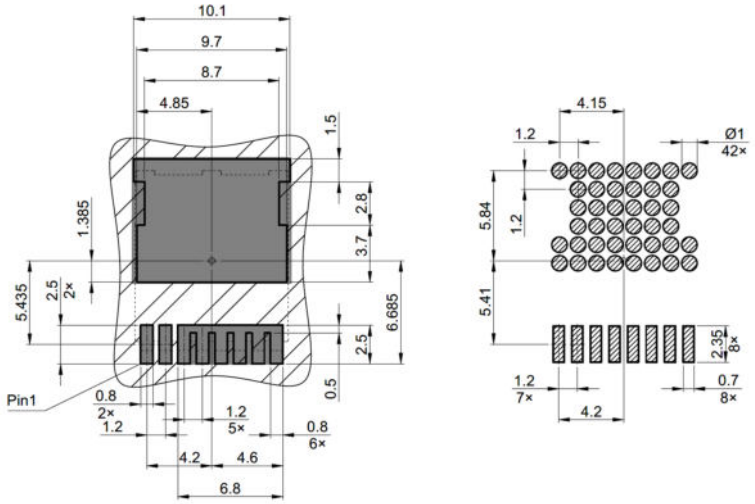


Package outline



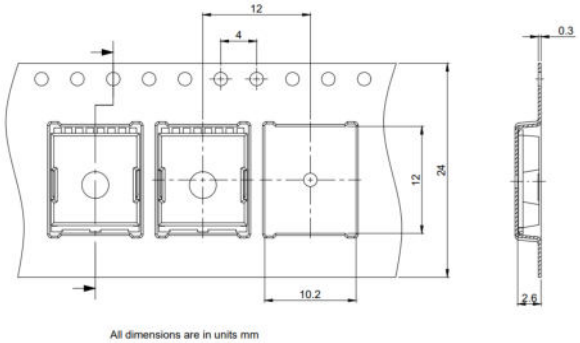
Lead length up to anti flash profile, mold flashes excluded
All dimensions are in units mm
The drawing is in compliance with ISO 128-30, Projection Method 1 [⇹]

Footprint



All dimensions are in units mm
All pads are solder mask defined

Packaging



All dimensions are in units mm
The drawing is in compliance with ISO 128-30, Projection Method 1 [⇹]

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Revision History

Revision	Date	Changes
Rev 1.0	2024-02-28	Final Data Sheet

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