

NCE N-Channel Enhancement Mode Power MOSFET

Description

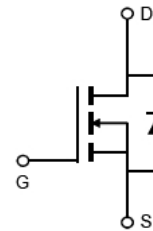
The NCE0103EM uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

Application

- DC/DC Converter
- Motor drive
- Power switching

General Features

- $V_{DS} = 100\text{ V}, I_D = 3\text{ A}$
- $R_{DS(ON)} < 160\text{ m}\Omega$ @ $V_{GS}=10\text{V}$ (typical: 139 m Ω)
- $R_{DS(ON)} < 170\text{ m}\Omega$ @ $V_{GS}=4.5\text{V}$ (typical: 145 m Ω)
- High density cell design for ultra low R_{dson}
- 150°C operating temperature
- Pb-free lead plating
- 100% Rg tested
- 100% ΔV_{ds} tested



Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
0103EM	NCE0103EM	SOT-89-3L	-	-	-

Absolute Maximum Ratings ($T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	± 20	V
Drain Current-Continuous	($T_A=25^\circ\text{C}$)	I_D	3	A
	($T_A=75^\circ\text{C}$)	$I_D(75^\circ\text{C})$	2.3	A
Pulsed Drain Current		I_{DM}	12	A
Maximum Power Dissipation		P_D	3	W
De-rating factor			0.0238	W/°C
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 To 150	°C

Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	10	°C/W
Thermal Resistance, Junction-to-Ambient ^(Note 1)	$R_{\theta JA}$	42	°C/W

Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

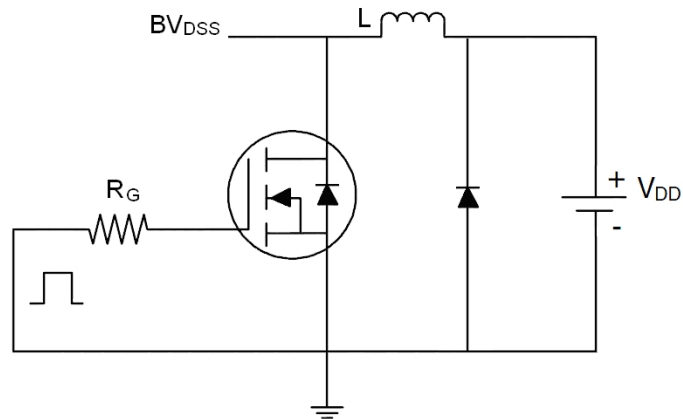
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	100	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =100V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±10	μA
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1.0	1.5	2.0	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =3A	-	139	160	mΩ
		V _{GS} =4.5V, I _D =3A	-	145	170	
Forward Transconductance	g _{FS}	V _{DS} =5V, I _D =3A	-	5	-	S
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =50V, V _{GS} =0V, F=1.0MHz	-	741	-	pF
Output Capacitance	C _{oss}		-	73	-	pF
Reverse Transfer Capacitance	C _{rss}		-	42	-	pF
Switching Characteristics (Note 2)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =50V, R _L =10Ω, V _{GS} =10V, R _{GEN} =3Ω	-	6	-	nS
Turn-on Rise Time	t _r		-	4	-	nS
Turn-Off Delay Time	t _{d(off)}		-	20	-	nS
Turn-Off Fall Time	t _f		-	4	-	nS
Total Gate Charge	Q _g	V _{DS} =50V, I _D =3A, V _{GS} =10V	-	16.7	-	nC
Gate-Source Charge	Q _{gs}		-	2.2	-	nC
Gate-Drain Charge	Q _{gd}		-	3.8	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =3A	-	-	1.2	V
Diode Forward Current	I _S		-	-	3	A

Notes:

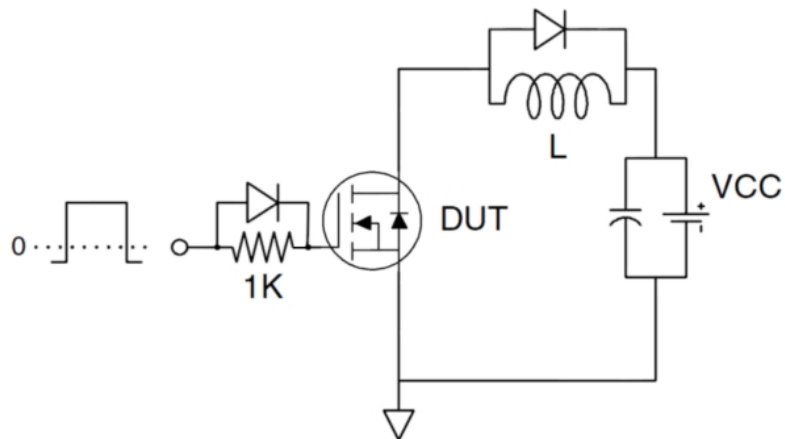
1. The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^{\circ}\text{C}$. The maximum allowed junction temperature of 150°C . The value in any given application depends on the user's specific board design, and the maximum temperature of 150°C may be used if the PCB allows it.
2. Guaranteed by design, not subject to production.
3. These curves are based on the junction-to-ambient thermal impedance, assuming a maximum junction temperature of $T_{J(MAX)}=150^{\circ}\text{C}$. The SOA curve provides a single pulse rating.

Test Circuit

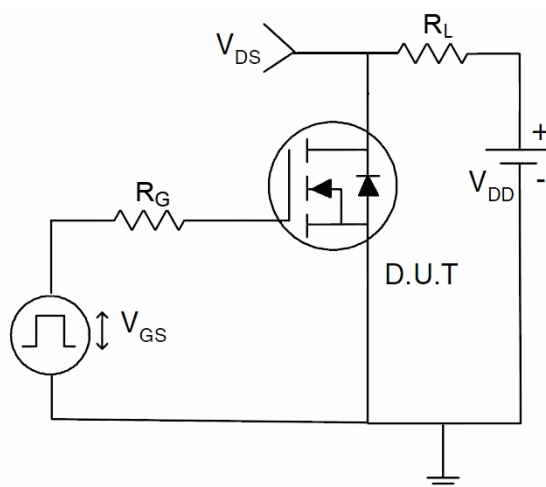
1) E_{AS} Test Circuits



2) Gate Charge Test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

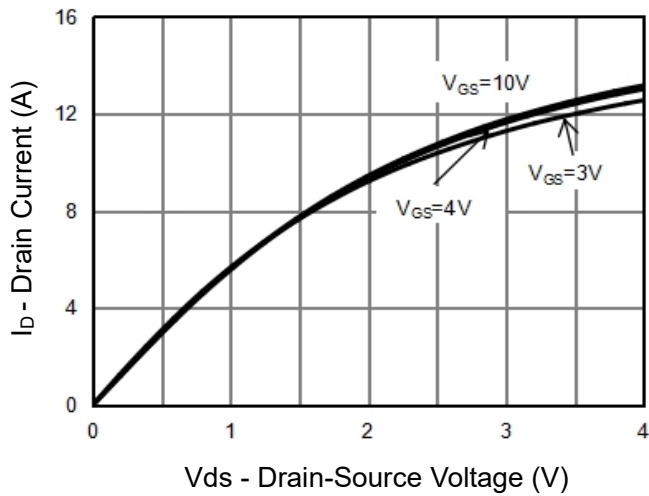


Figure 1 Output Characteristics

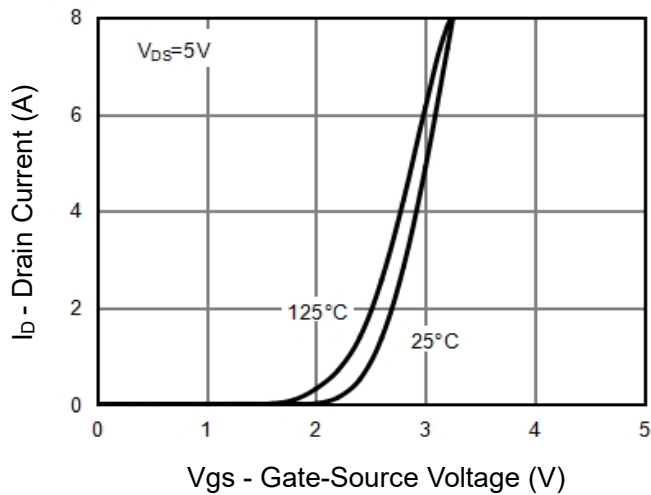


Figure 2 Transfer Characteristics

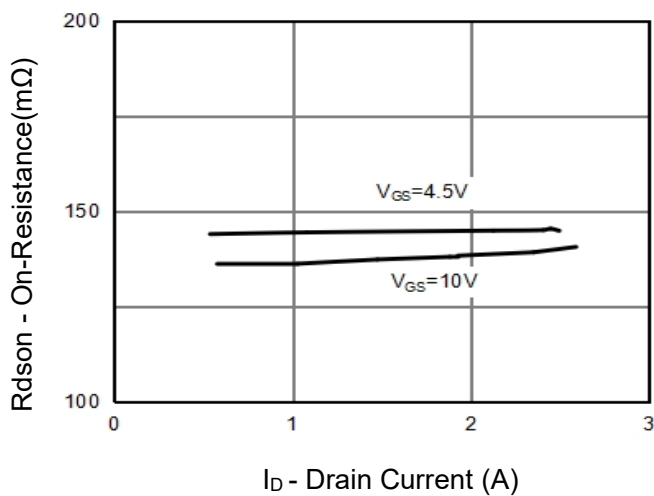


Figure 3 R_{dson} vs Drain Current

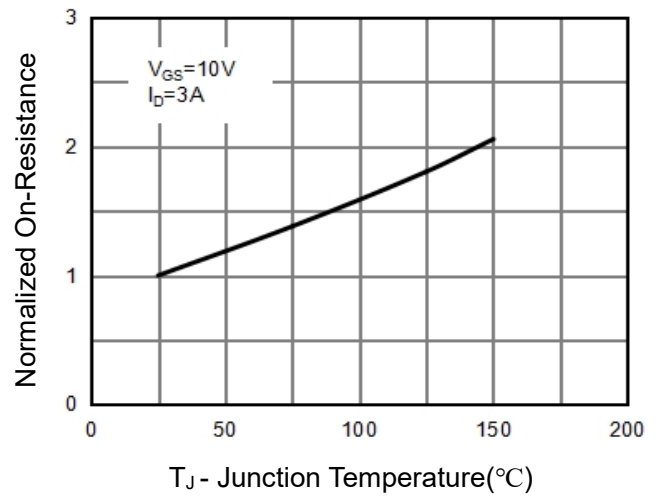


Figure 4 R_{dson} vs Junction Temperature

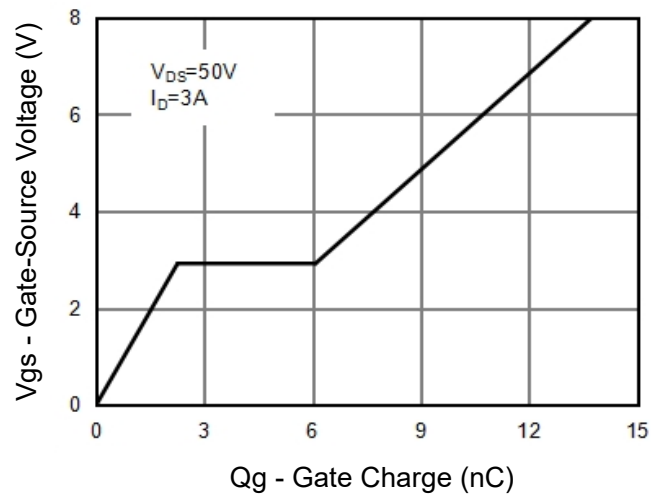


Figure 5 Gate Charge

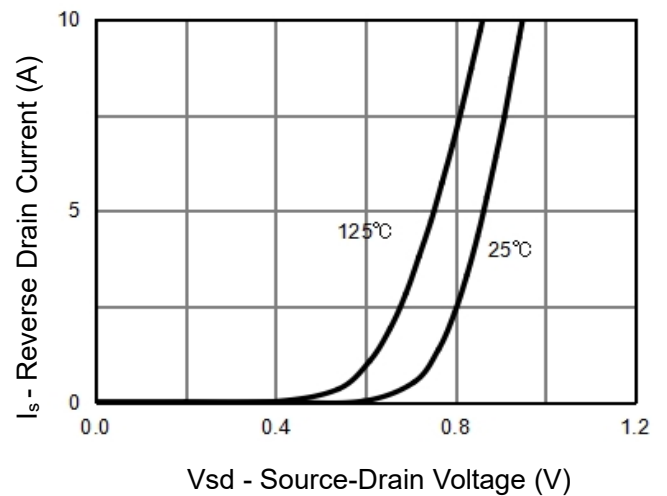
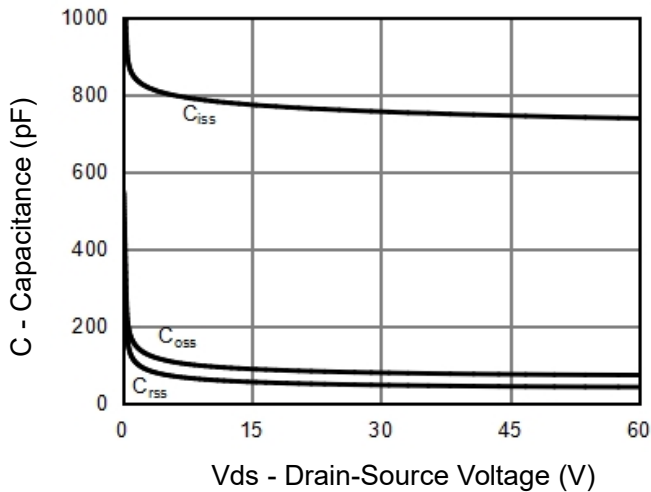
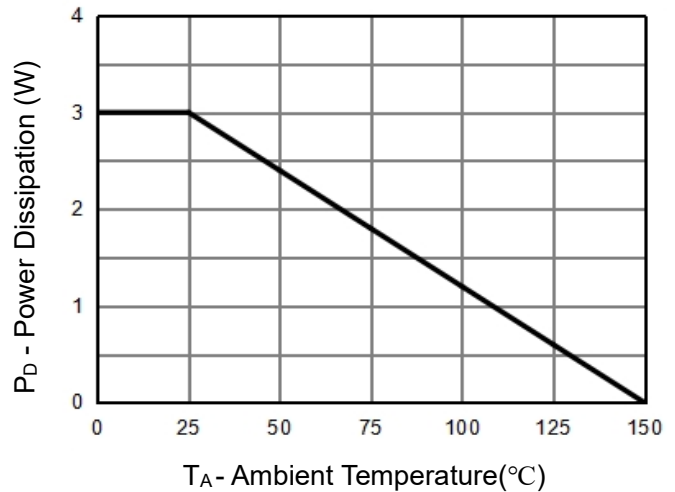


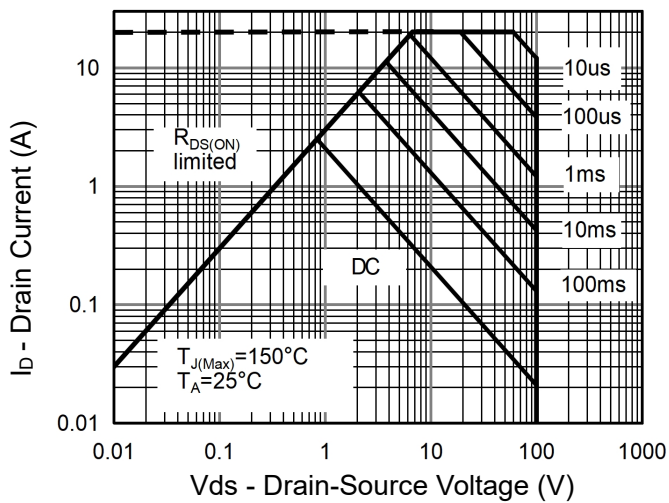
Figure 6 Source-Drain Diode Forward



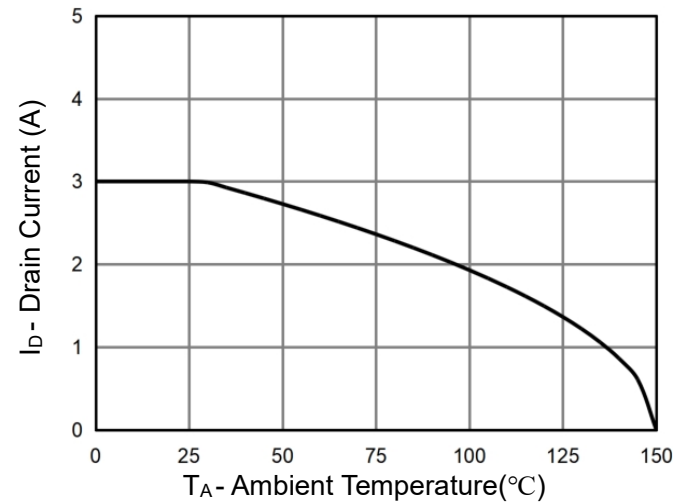
Vds - Drain-Source Voltage (V)
Figure 7 Capacitance vs Vds



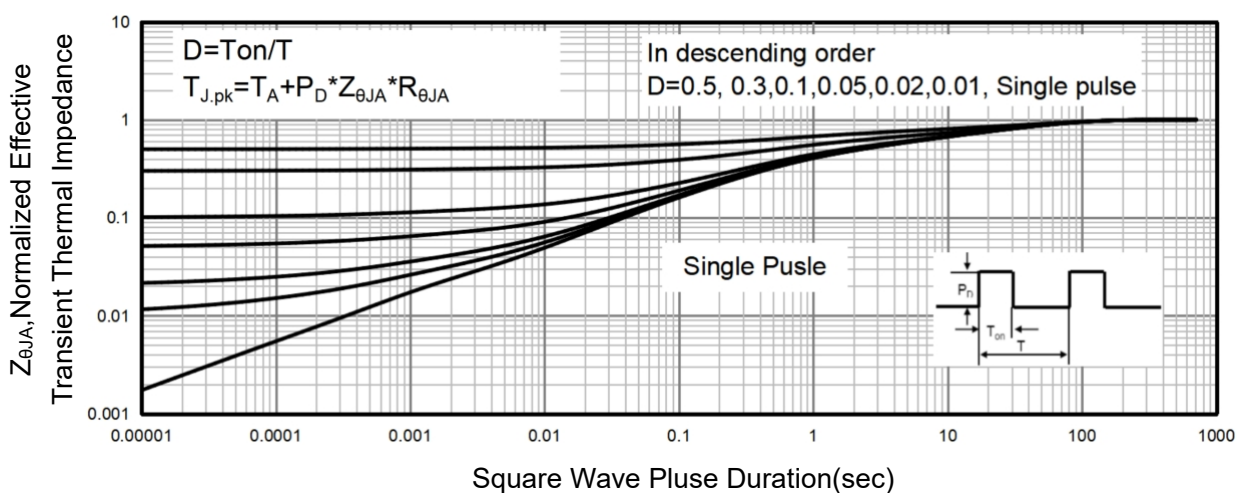
TA - Ambient Temperature(°C)
Figure 9 Power De-rating



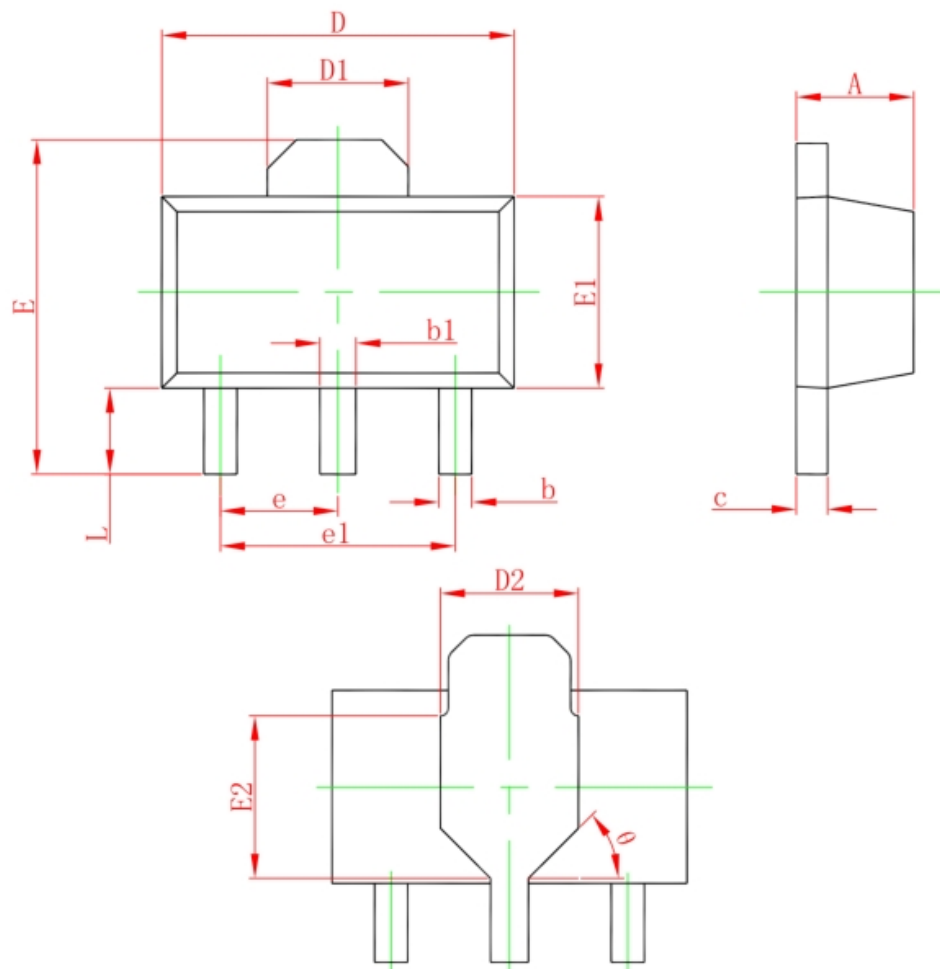
Vds - Drain-Source Voltage (V)
Figure 8 Safe Operation Area (Note 3)



TA - Ambient Temperature(°C)
Figure 10 Drain Current De-rating



Square Wave Pulse Duration(sec)
Figure 11 Normalized Maximum Transient Thermal Impedance

SOT-89-3L(C) Package Information


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.380	0.580	0.015	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF.		0.061 REF.	
D2	1.750 REF.		0.069 REF.	
E	3.940	4.250	0.155	0.167
E1	2.300	2.600	0.091	0.102
E2	1.900 REF.		0.075 REF.	
e	1.500 TYP.		0.060 TYP.	
e1	3.000 TYP.		0.118 TYP.	
L	0.900	1.200	0.035	0.047
θ	45°		45°	

Revision History

Revision	Date	Subjects
V1.0	2026.3	Product data sheet.

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