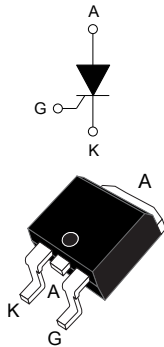


40 A, 800 V, automotive grade SCR thyristor in D²PAK package



Features

- AEC-Q101 qualified 
- High junction temperature: 150 °C
- DC off state voltage: ±800 V
- Nominal RMS on-state current: 40 A_{RMS}
- High EFT noise immunity: 1000 V/μs
- Maximum I_{GT} = 35 mA
- ECOPACK2 compliant component

Applications

- Battery management system
- Capacitor discharge
- On-board charger
- Overvoltage crowbar protection
- Power supplies
- AC Switches
- Solid state relays

Description

The **TN4035HA-8GY** is an automotive grade SCR thyristor designed for applications such as automotive capacitor discharge for battery management system and battery on-board chargers.

The performances of the **TN4035HA-8GY** are also a plus for applications where in-rush current conditions are critical, such as overvoltage crowbar protection circuits in power supplies, in-rush current limiting circuits, solid state relays (in back-to-back configuration), welding equipment, high power motor control circuits.

The **TN4035HA-8GY** is available in D²PAK package, ideal for advanced SMD designs.

Product status link

[TN4035HA-8GY](#)

Product summary

I _{T(RMS)}	40 A
V _{DRM} /V _{RRM}	800 V
V _{DSM} /V _{RSM}	900 V
I _{GT}	35 mA
T _{jmax.}	150 °C

1 Characteristics

Table 1. Absolute ratings (limiting values)

Symbol	Parameter			Value	Unit
I _{T(RMS)}	RMS on-state current (180 ° conduction angle)		T _C = 120 °C	40	A
I _{T(AV)}	Average on-state current (180 ° conduction angle)			25	
I _{TSM}	Non repetitive surge peak on-state current, V _R = 0 V	t _p = 8.3 ms	T _j initial = 25 °C	658	A
		t _p = 10 ms		600	
I ² t	I ² t value for fusing	t _p = 10 ms	T _j = 25 °C	1800	A ² s
di/dt	Critical rate of rise of on-state current, I _G = 2 x I _{GT} , tr ≤ 100 ns	f = 50 Hz	T _j = 150 °C	400	A/μs
V _{DRM}	Repetitive peak off-state voltage		T _j = +150 °C	800	V
V _{RRM}	Repetitive peak off-state voltage		T _j = +150 °C	800	V
V _{DSM} / V _{RSM}	Non repetitive surge peak off-state voltage	t _p = 10 ms	T _j = 25 °C	900	V
V _{GM}	Peak forward gate voltage	t _p = 20 μs	T _j = 150 °C	10	V
I _{GM}	Peak forward gate current			8	A
V _{RGM}	Maximum peak reverse gate voltage		T _j = 25 °C	5	V
P _{G(AV)}	Average gate power dissipation		T _j = 150 °C	1	W
T _{stg}	Storage junction temperature range			-40 to +150	°C
T _j	Operating junction temperature				

Table 2. Electrical characteristics ($T_j = 25\text{ °C}$ unless otherwise specified)

Symbol	Test Conditions		Value	Unit	
I _{GT}	V _D = 12 V, R _L = 33 Ω		Min.	3.5	mA
Max.			35		
V _{GT}			Max.	1.3	V
V _{GD}	V _D = 800 V, R _L = 3.3 kΩ	T _j = 150 °C	Min.	0.2	V
I _{GD}			Min.	1	mA
I _H	I _T = 500 mA, gate open		Max.	75	mA
I _L	I _G = 1.2 x I _{GT}		Max.	150	mA
dV/dt	V _D = 67 % V _{DRM} , gate open	T _j = 125 °C	Min.	2000	V/μs
		T _j = 150 °C	Min.	1500	

Table 3. Timing Parameters

Symbol	Test Conditions			Value	Unit
t_{gt}	$I_T = 80\text{ A}$, $V_D = 800\text{ V}$, $I_G = 100\text{ mA}$, $di_G/dt = 0.2\text{ A}/\mu s$	$T_j = 25\text{ °C}$	Typ.	0.5	μs
t_q	$I_T = 40\text{ A}$, $V_D = 800\text{ V}$, $(di/dt)_{OFF} = 10\text{ A}/\mu s$, $V_R = 75\text{ V}$, $dV_D/dt = 20\text{ V}/\mu s$, $t_p = 100\text{ }\mu s$	$T_j = 150\text{ °C}$	Typ.	85	μs

Table 4. Static Characteristics

Symbol	Test Conditions			Value	Unit
V_{TM}	$I_{TM} = 80\text{ A}$, $t_p = 380\text{ }\mu\text{s}$	$T_j = 25\text{ }^\circ\text{C}$	Max.	1.50	V
V_{TO}	On-state threshold voltage	$T_j = 150\text{ }^\circ\text{C}$	Max.	0.80	V
R_D	On-state dynamic resistance	$T_j = 150\text{ }^\circ\text{C}$	Max.	8.3	m Ω
I_{DRM}/I_{RRM}	$V_D = V_R = 400\text{ V}$	$T_j = 125\text{ }^\circ\text{C}$	Max.	0.65	mA
	$V_D = V_R = 600\text{ V}$	$T_j = 125\text{ }^\circ\text{C}$		1.00	mA
	$V_{DRM} = V_{RRM} = 800\text{ V}$	$T_j = 25\text{ }^\circ\text{C}$		5	μA
		$T_j = 150\text{ }^\circ\text{C}$		9	mA
I_{DSM}/I_{RSM}	$V_D = V_R = 900\text{ V}$	$T_j = 25\text{ }^\circ\text{C}$	Max.	6	μA

Table 5. Thermal parameters

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Thermal resistance junction to case (DC)	Max.	0.5	$^\circ\text{C/W}$
$R_{th(j-a)}$	Junction to ambient, ($S_{CU} = 2.5\text{ cm}^2$, thickness = $70\text{ }\mu\text{m}$)	Typ.	45	

1.1 Characteristics (curves)

Figure 1. Maximum average power dissipation versus average on-state current

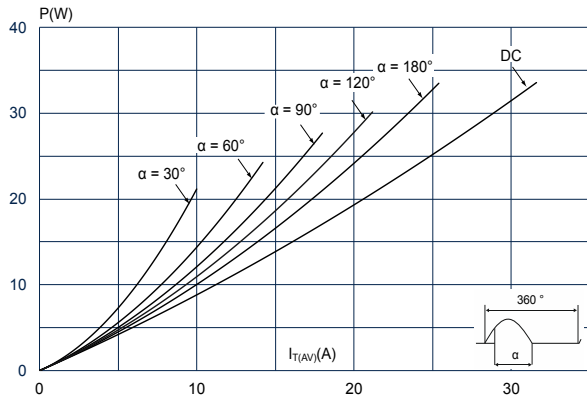


Figure 2. Average and D.C. on-state current versus case temperature

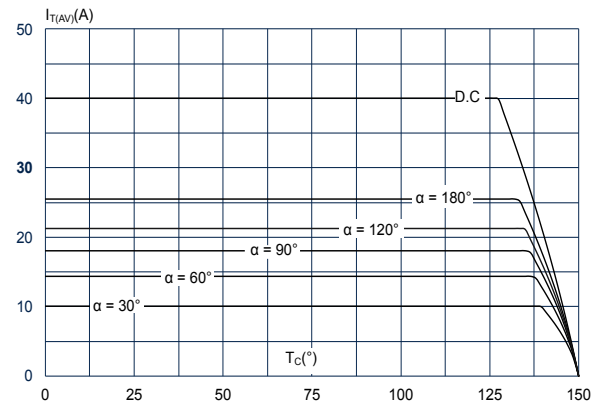


Figure 3. Average and D.C. on-state current versus ambient temperature

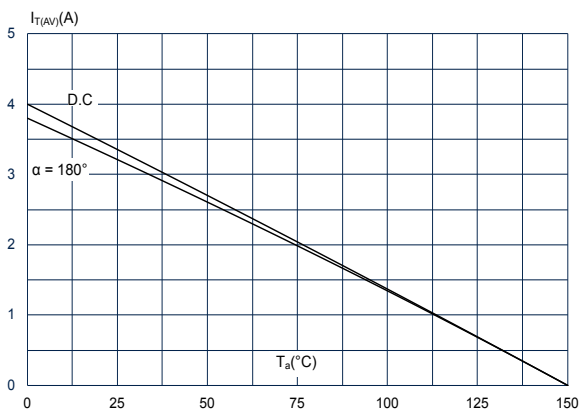


Figure 4. On-state characteristics (maximum values)

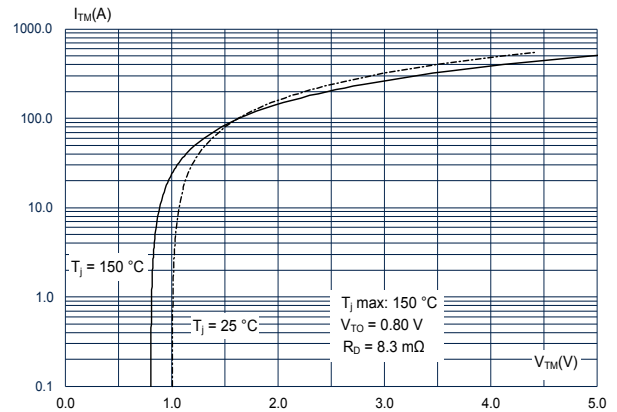


Figure 5. Relative variation of thermal impedance junction to case and junction to ambient versus pulse duration

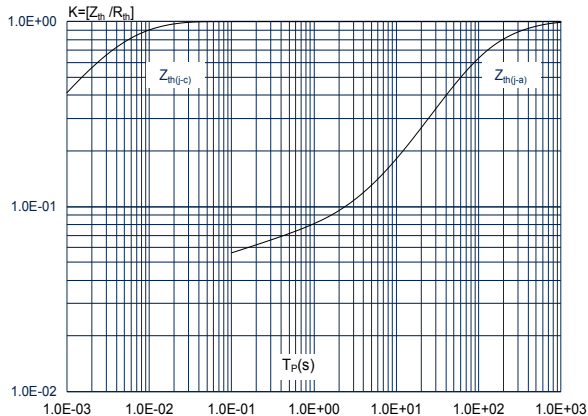


Figure 6. Surge peak on-state current versus number of cycles

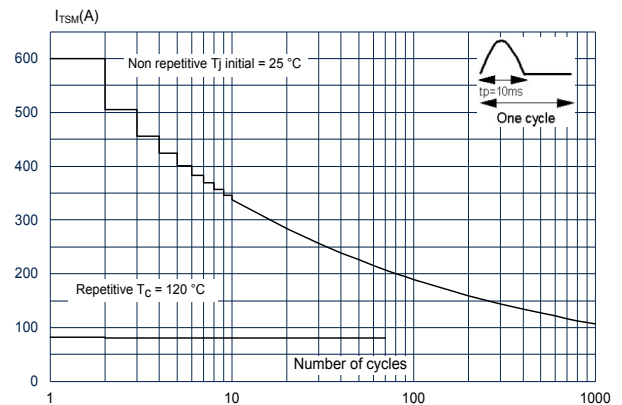


Figure 7. Non repetitive surge peak on-state current for a sinusoidal pulse with width $t_p < 10$ ms and corresponding value of I^2t

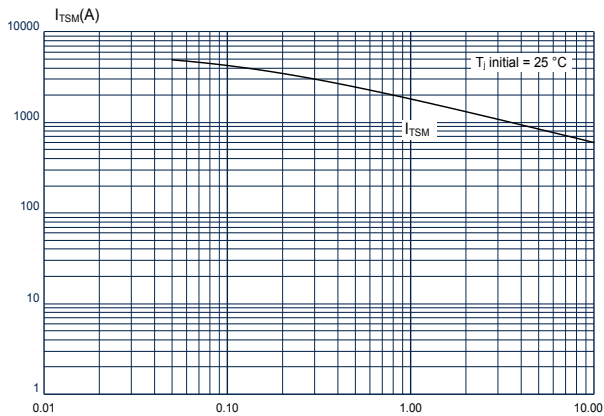


Figure 8. Relative variation of holding and latching current versus junction temperature (typical values)

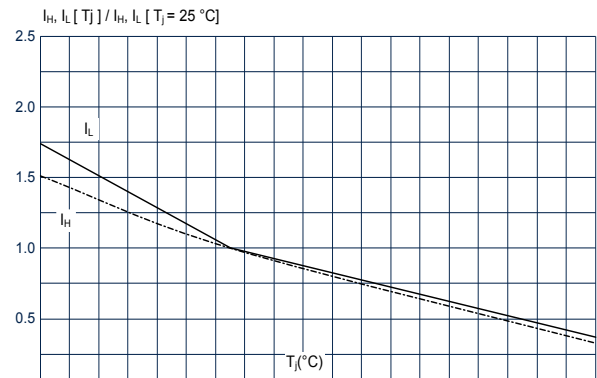


Figure 9. Relative variation of gate trigger current and gate voltage versus junction temperature (typical values)

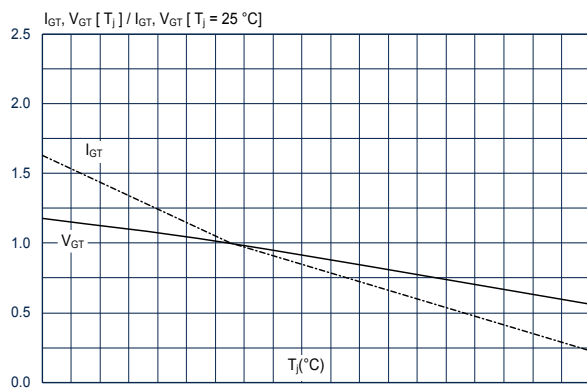


Figure 10. Gate characteristic

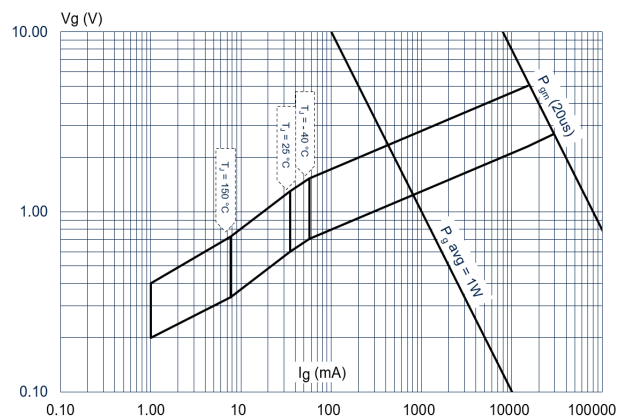


Figure 11. Relative variation of leakage current versus junction temperature

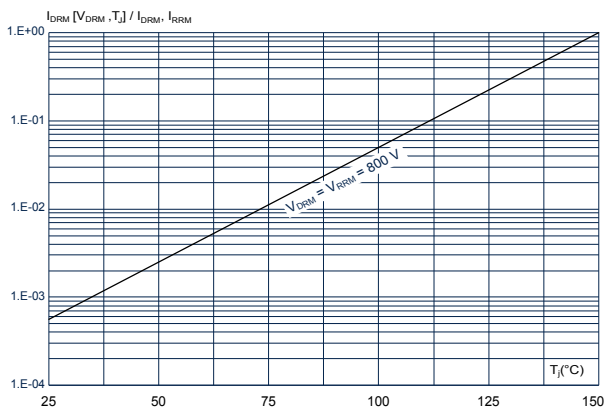


Figure 12. Thermal resistance junction to ambient versus copper surface under tab (typical values, epoxy printed board FR4) (D²PAK)

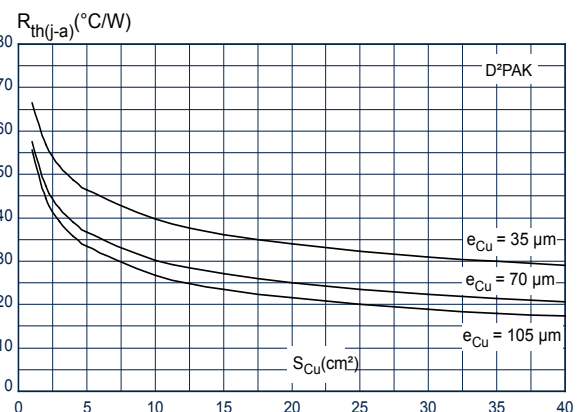
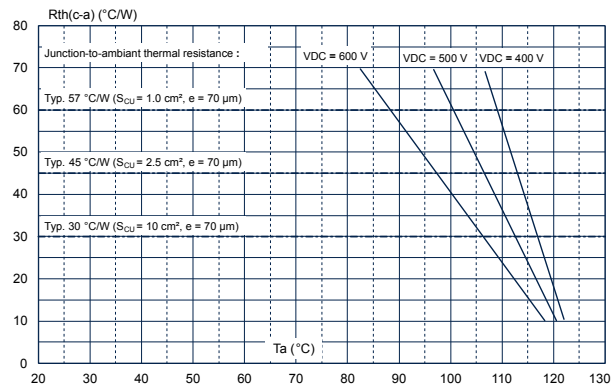


Figure 13. Recommended maximum case-to-ambient thermal resistance versus ambient temperature for different DC off-state voltages (200 V, 400 V, 600 V)



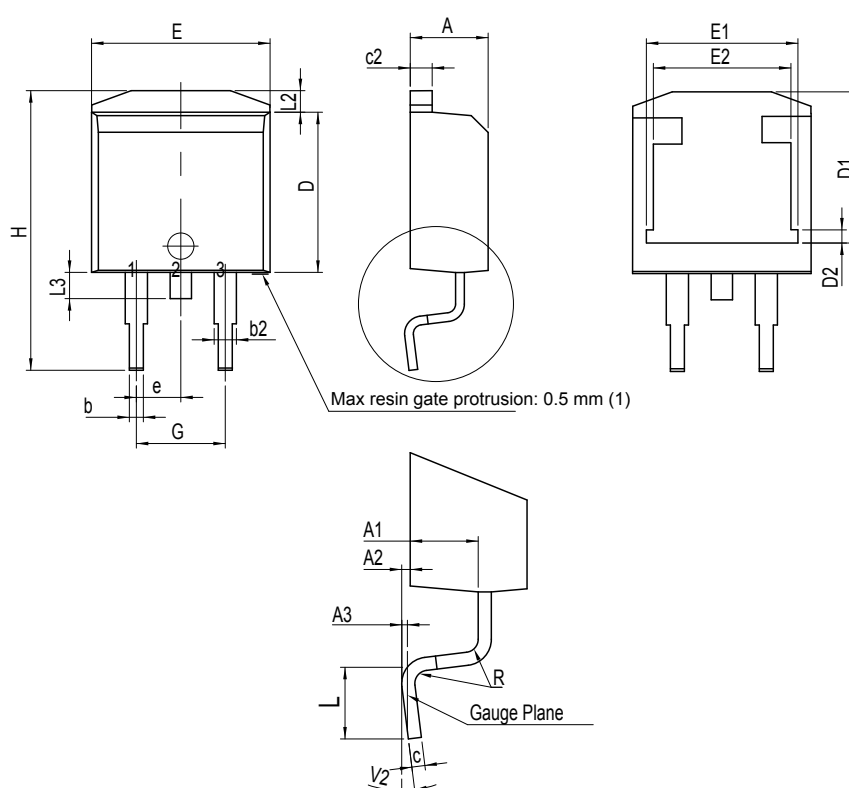
2 Package information

To meet environmental requirements, ST offers these devices in different grades of **ECOPACK** packages, depending on their level of environmental compliance. ECOPACK specifications, grade definitions, and product status are available at: www.st.com. ECOPACK is an ST trademark.

2.1 D²PAK package information

- Molding compounded resin is halogen free and meets UL94 flammability standard, level V0
- Lead-free package leads plating
- Molding compound resin is material group 2

Figure 14. D²PAK package outline

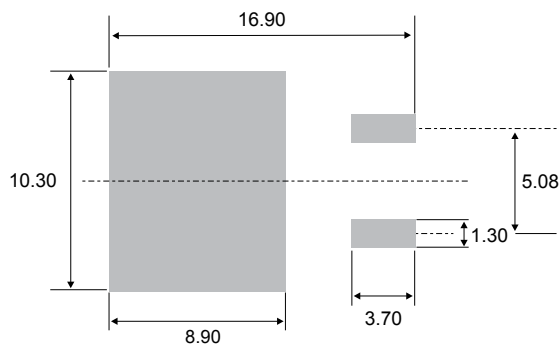


(1) Resin gate is accepted in each of position shown on the drawing, or their symmetrical.

Table 6. D²PAK package mechanical data

Ref.	Dimensions					
	Millimeters			Inches ⁽¹⁾		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.30		4.60	0.1693		0.1811
A1	2.49		2.69	0.0980		0.1059
A2	0.03		0.23	0.0012		0.0091
A3		0.25			0.0098	
b	0.70		0.93	0.0276		0.0366
b2	1.25		1.7	0.0492		0.0669
c	0.45		0.60	0.0177		0.0236
c2	1.21		1.36	0.0476		0.0535
D	8.95		9.35	0.3524		0.3681
D1	7.50		8.00	0.2953		0.3150
D2	1.30		1.70	0.0512		0.0669
e		2.54			0.1	
E	10.00		10.28	0.3937		0.4047
E1	8.30		8.70	0.3268		0.3425
E2	6.85		7.25	0.2697		0.2854
G	4.88		5.28	0.1921		0.2079
H	15		15.85	0.5906		0.6240
L	1.78		2.28	0.0701		0.0898
L2	1.19		1.40	0.0470		0.0551
L3	1.40		1.75	0.0551		0.0689
R		0.40			0.0157	
V2	0°		8°	0°		8°

1. Dimensions in inches are given for reference only

Figure 15. D²PAK recommended footprint (dimensions are in mm)


Technical drawing of a rectangular plate with a grid of holes. The drawing shows a top view and a side view.

Top View Dimensions:

- Overall width: 8,90
- Overall height: 10,30 (with a note $(10,20)$)
- Grid of holes: 4 rows by 3 columns.
- Horizontal spacing between hole centers: $2 \times 0,27$ (total $0,54$) and 4×2 (total 8). The total width of the hole grid is $(8,81)$.
- Vertical spacing between hole centers: $4 \times 2,10$ (total $8,40$) and $3 \times 0,60$ (total $1,80$). The total height of the hole grid is $10,20$.
- Margin from left edge to first hole center: 0,05.
- Margin from bottom edge to first hole center: 0,05.
- Margin from right edge to last hole center: 0,26.

Side View Dimensions:

- Overall width: 4,30
- Overall height: 5,08
- Thickness of the plate: 2,54
- Width of the hole: 3,70
- Height of the hole: 1,20
- Margin from bottom edge to hole center: 1,30

3 Ordering information

Figure 17. Ordering information scheme

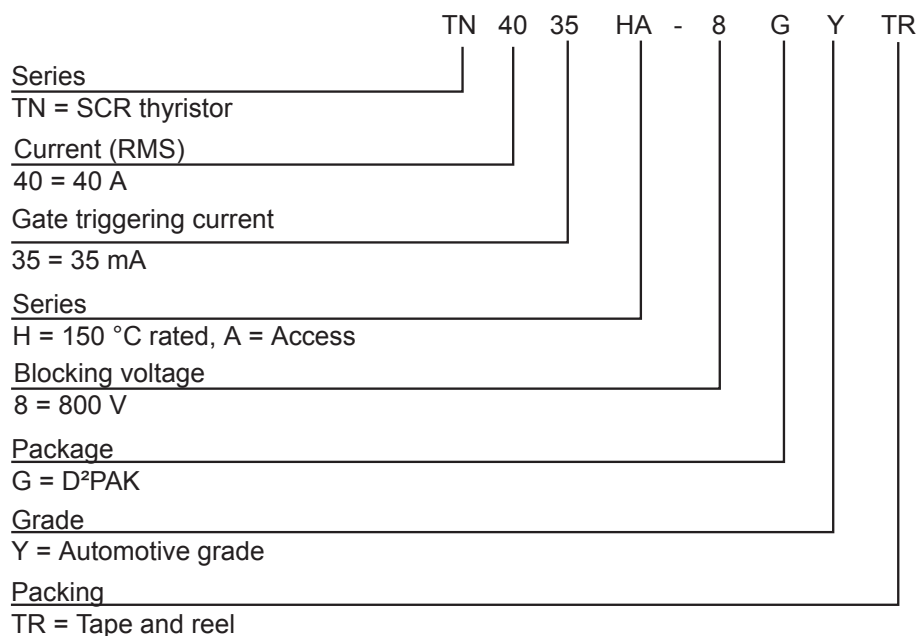


Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
TN4035HA-8GY-TR	TN4035HA8GY	D ² PAK	1.38 g	1000	Tape and reel
TN4035HA-8GY				50	Tube

Revision history

Table 8. Document revision history

Date	Revision	Changes
05-Apr-2023	1	Initial release.
11-Jul-2025	2	Updated Table 7

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