

GR-65P150XA: 650V Cascode GaN HEMT

Description

GR-65P150XA is a normally-off GaN High electron mobility transistor (HEMT) device using the cascode configuration, which provides high breakdown voltage, high current and high operating speed which is suitable for high power applications. In addition, The GR-65P150XA provides integrated ESD protection on all three terminals (Gate, Drain, and Source), with an ESD robustness greater than 2 kV according to the Human Body Model (HBM).

Key Specifications

Part Number	GR-65P150XA
V_{DS}	650V
$V_{(TR)DS}$	800V
$R_{DS(ON)}$, typ.	148m Ω
Q_G , typ.	11.0nC
Package	TO-252

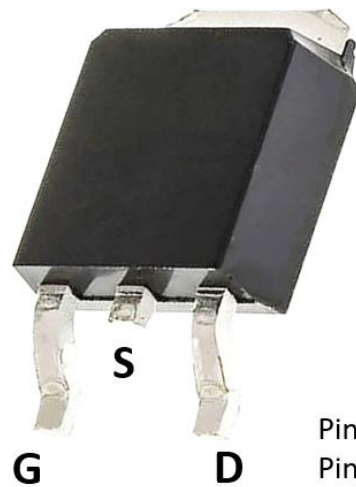
Features

- Gate drive voltage compatibility (-20V to +20V)
- High operating frequency
- Pin to Pin with CoolMOS/SJ and SiC MOSFET
- Low Q_{rr}
- ESD-resistant
- Comply with JEDEC standards

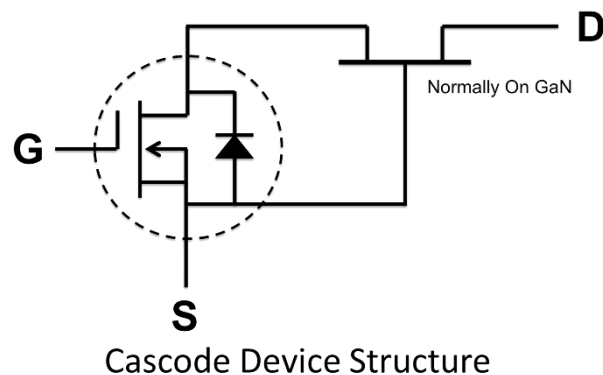
Applications

- Switch Mode Power Supplies (SMPS)
- AC-DC/ DC-DC Converters
- Motor Drives

GR-65P150XA (TO-252)



Pin 1: Gate
Pin 2: Source
Pin 3: Drain



1- Electrical Characteristics

➤ **Table 1 Absolute maximum ratings**

Symbol	Parameter		Value	Unit
V_{DS}	Drain-source voltage		650	V
V_{GS}	Gate- source voltage		-20V ~ +20V	V
I_D	Drain current (continuous) at $T_C = 25^\circ\text{C}$ operation		12	A
	Drain current (continuous) at $T_C = 100^\circ\text{C}$ operation		9.5	A
$I_{D,pulse}$	Pulsed drain current (pulse width: 10 μ s)		45	A
P_D	Maximum power dissipation $T_C=25^\circ\text{C}$		78	W
T_C	Operating temperature	Case	-55 to +150	$^\circ\text{C}$
T_J		Junction	-55 to +150	$^\circ\text{C}$
T_S	Storage temperature		-55 to +150	$^\circ\text{C}$
T_{SOLD}	Soldering peak temperature ^b		260	$^\circ\text{C}$
MSL	Moisture sensitivity level		MSL3	

a. In off-state, spike duty cycle $D < 0.01$, spike duration $< 1\mu\text{s}$

b. For 10 sec., 1.6mm from the case

➤ **Table 2 Thermal Characteristics**

Symbol	Parameter	Value	Unit
$R_{\theta JA}$	Thermal resistance junction-ambient	63	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal resistance junction-case	1.6	$^\circ\text{C/W}$

➤ **Table 3 ESD Rating**

Symbol	Reference	Value	Unit
HBM (G-S) (G-D)	ANSI/ESDA/JEDEC JS-001-2024	2000	V
HBM (D-S)	ANSI/ESDA/JEDEC JS-001-2024	8000	V

➤ **Table 4 Electrical Characteristics** ($T_{CASE} = 25\text{ }^{\circ}\text{C}$ unless otherwise stated)

Symbol	Parameter	Conditions	Values			Unit
			min.	typ.	max.	
V_{DSS}	Drain-source voltage	$V_{GS}=0V$	650	-	-	V
$V_{GS(th)}$	Gate threshold voltage	$V_{GS}=V_{DS}$, $I_D=1mA$	1.3	1.7	2.3	V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS}=10V$, $I_D=5A$, $T_J=25\text{ }^{\circ}\text{C}$	-	148	182	$m\Omega$
		$V_{GS}=10V$, $I_D=5A$, $T_J=150\text{ }^{\circ}\text{C}$	-	266	-	
I_{DSS}	Drain-source leakage current	$V_{GS}=0V$, $V_{DS}=650V$, $T_J=25^{\circ}\text{C}$	-	2.5	50	μA
		$V_{GS}=0V$, $V_{DS}=650V$, $T_J=150^{\circ}\text{C}$	-	10.0	-	
I_{GSS}	Gate-to-source forward leakage current	$V_{GS}=20V$	-	-	100	nA
	Gate-to-source reverse leakage current	$V_{GS}=-20V$	-	-	-100	
C_{ISS}	Input capacitance	$V_{GS}=0V$, $V_{DS}=400V$, $f=1MHz$	-	1105	-	pF
C_{OSS}	Output capacitance		-	20.2	-	
C_{RSS}	Reverse transfer capacitance		-	1.97	-	
Q_G	Gate charge	$V_{GS}=0\sim 10V$, $V_{DS}=400V$, $I_{DS}=5A$	-	11.0	-	nC
Q_{GS}	Gate-source charge		-	2.6	-	
Q_{GD}	Gate-drain charge		-	2.3	-	
Q_{OSS}	Output charge	$V_{GS}=0V$, $V_{DS}=0\sim 400V$	-	30.8	-	
$t_{D(on)}$	Turn-on delay time	$V_{DS}=400V$, $V_{GS}=0$ to $10V$, $I_{DS}=2A$, $R_G=25\Omega$	-	8.0	-	ns
$t_{D(off)}$	Turn-off delay time		-	13	-	
Q_{RR}	Reverse recovery charge	$I_S=5A$, $V_{DS}=400V$	-	6.0	-	nC

2- Typical Characteristic Curves

Fig 1. On-Region Characteristics

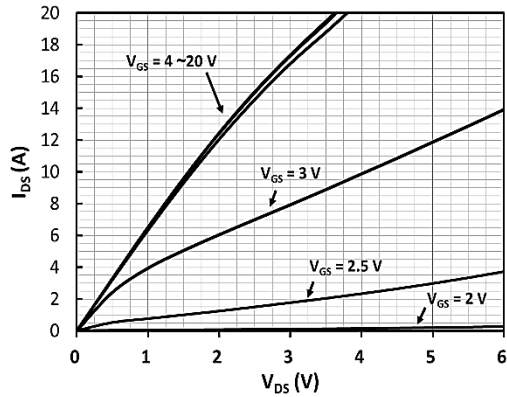


Fig 2. On-Resistance vs Drain Current and Temperature

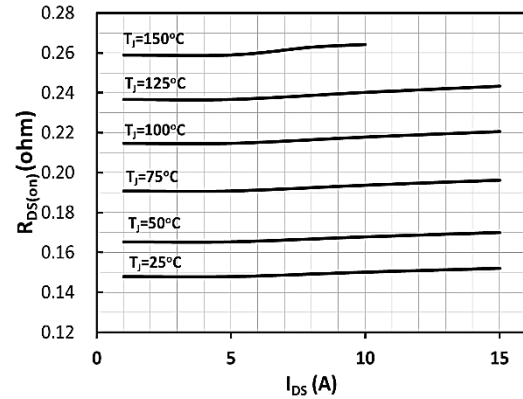


Fig 3. On-Resistance with Drain Current

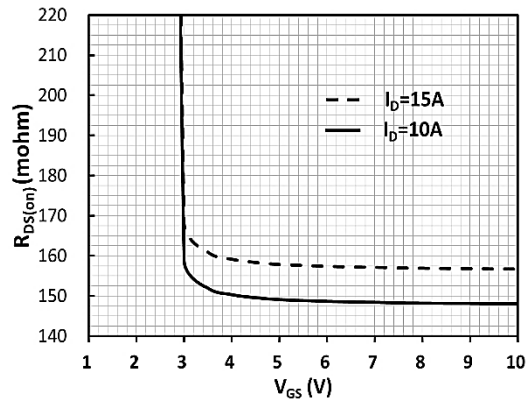


Fig 4. On-Resistance Variation with Temperature

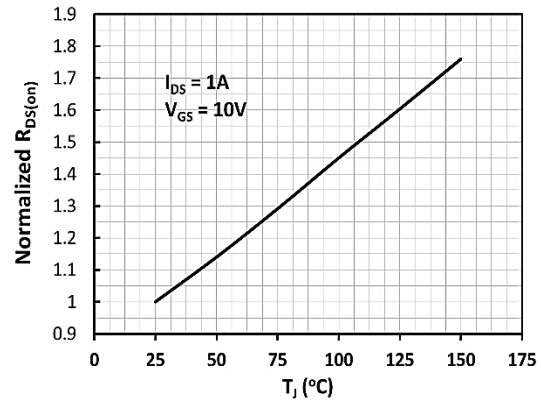


Fig 5. Threshold Voltage with Temperature

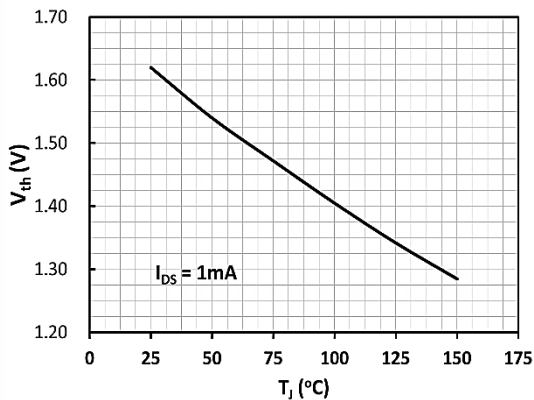


Fig 6. Capacitance Characteristics

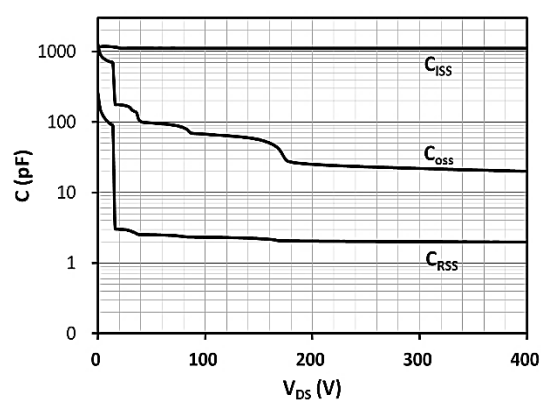


Fig 7. Gate Charge Characteristics, Qg

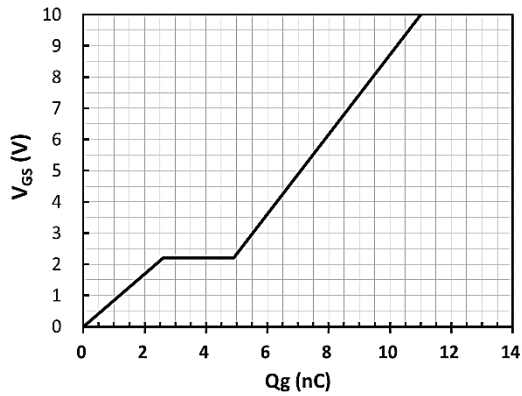


Fig 8. Capacitance Characteristics, Qoss

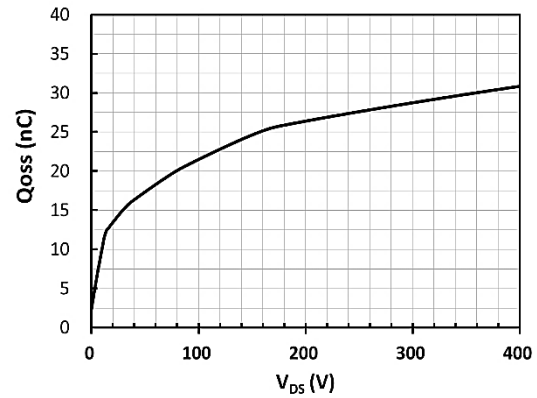
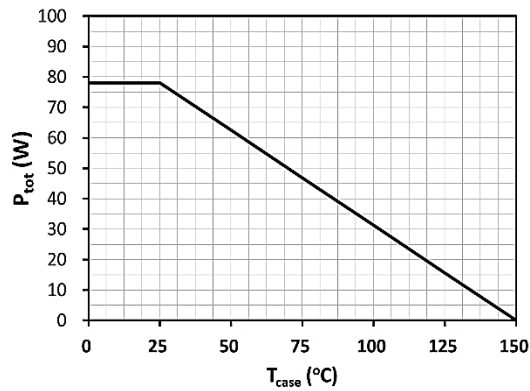
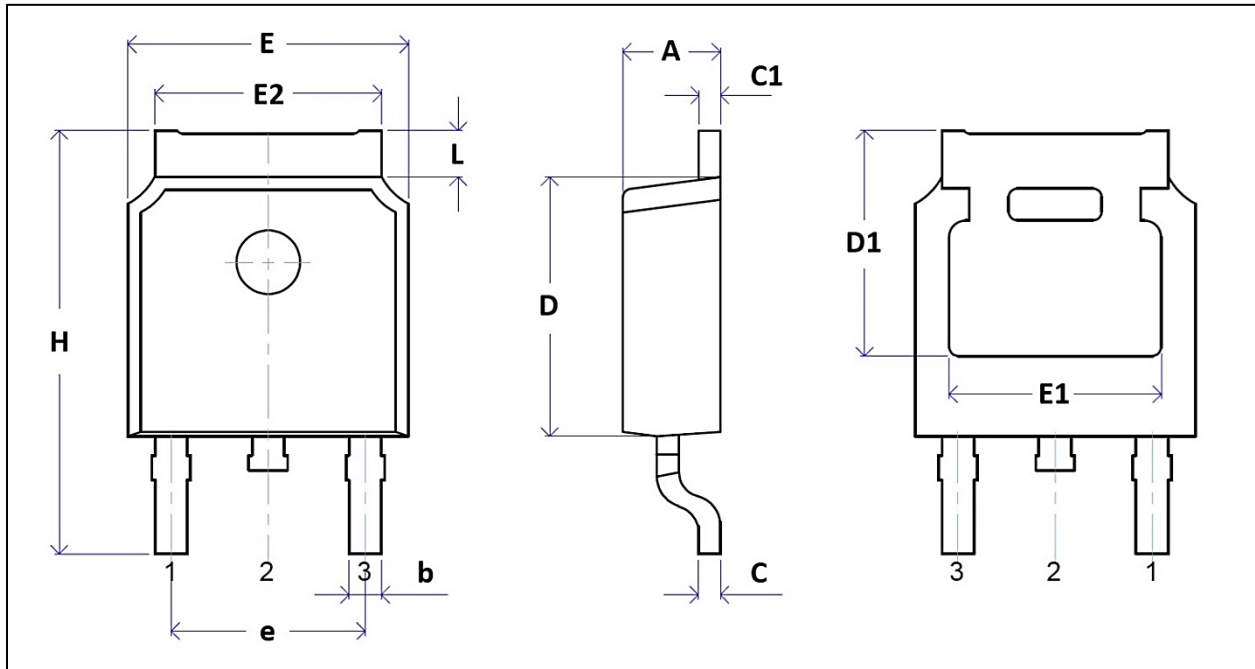


Fig 9. Power Dissipation Derating, Ptot



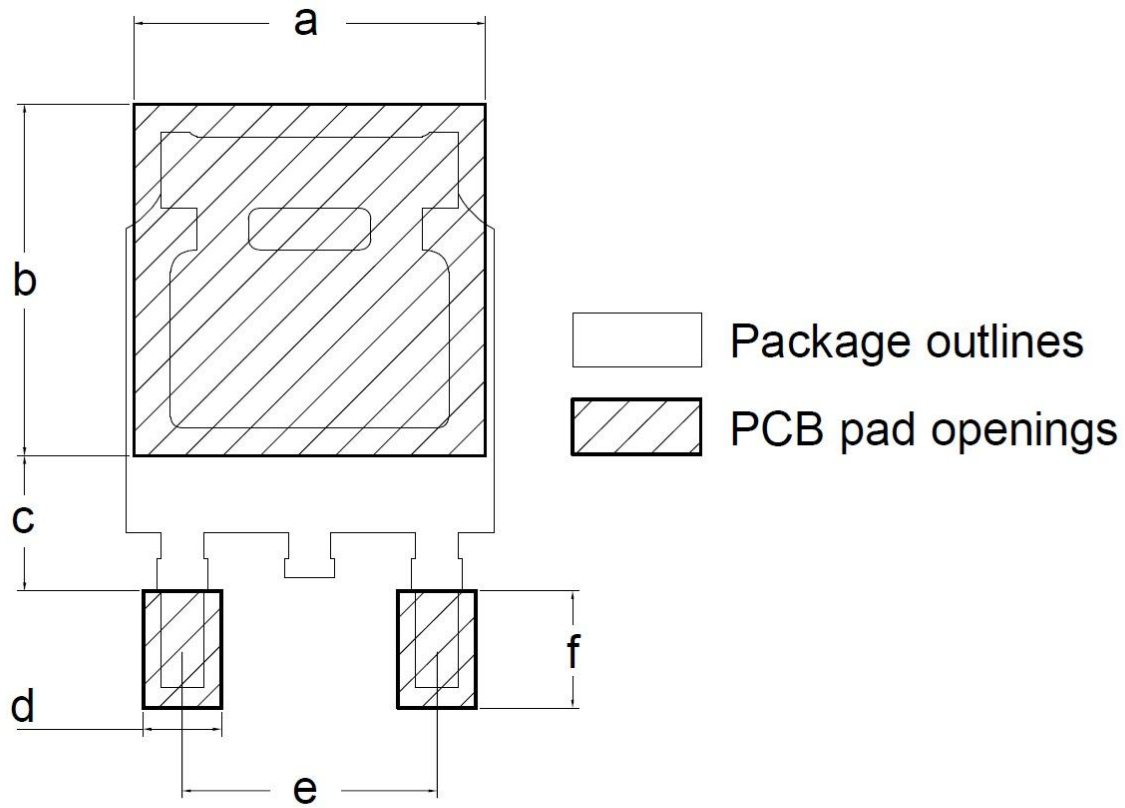
3- Package Outline Dimensions, GR-TO-252



➤ Table 5 Dimension of GR-TO-252

SYMBOL	DIMENSION (IN MM)			SYMBOL	DIMENSION (IN MM)		
	MIN.	NOM.	MAX.		MIN.	NOM.	MAX.
A	2.10	2.30	2.50	E	6.40	6.60	6.80
b	0.66	0.76	0.86	E1	4.80	5.00	5.20
C	0.40	0.50	0.60	E2	5.18	5.33	5.48
C1	0.44	0.51	0.58	e	4.57 REF		
D	5.90	6.10	6.30	H	9.50	10.10	10.70
D1	5.30 REF			L	1.09	1.15	1.21

Recommended PCB Soldering Footprint, GR-TO-252



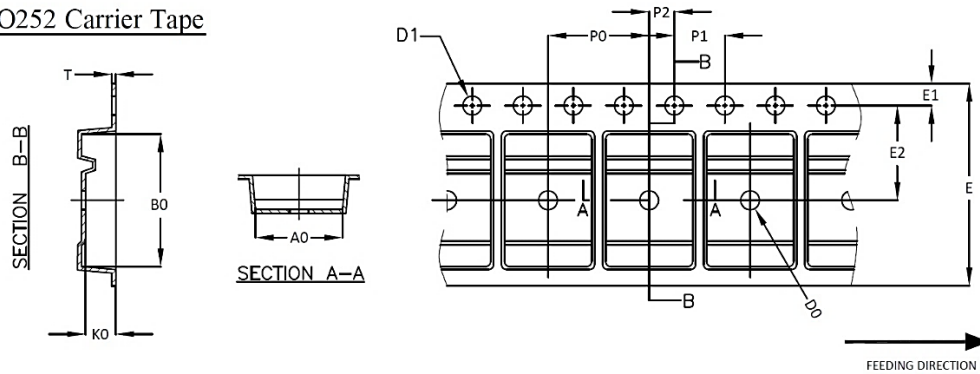
SYMBOL	DIMENSION	SYMBOL	DIMENSION
a	6.3	d	1.4
b	6.3	e	4.572
c	2.42	f	2.1

Notes :

- (1) All dimension in millimeters.
- (2) Drawing not to scale.

4- Tape & Reel Information

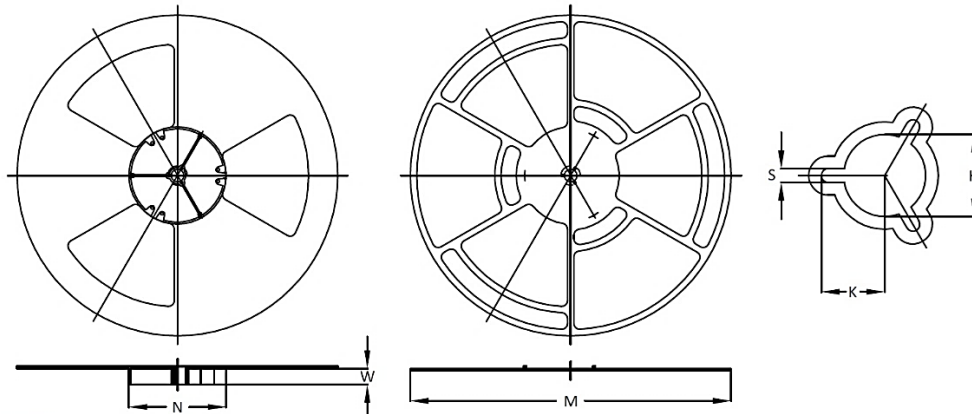
TO252 Carrier Tape



UNIT: MM

PACKAGE	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
DPAK (16 mm)	6.90 ±0.10	10.50 ±0.10	2.50 ±0.10	1.50 +0.1 -0	1.50 +0.1 -0	16.00 ±0.30	1.75 ±0.10	7.50 ±0.10	8.00 ±0.10	4.00 ±0.10	2.00 ±0.10	0.30 ±0.05

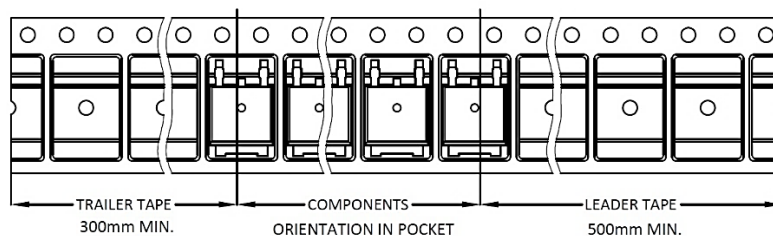
TO252 Reel



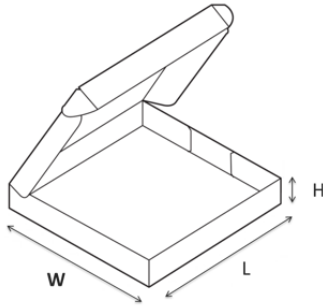
UNIT: MM

TAPE SIZE	REEL SIZE	M	N	W	H	K	S
16 mm	Ø330	Ø330.00 +0.25 -4.00	Ø100.00 ±0.2	16.4 +2.0 -0.0	Ø13.00 +0.50 -0.20	10.5 ±0.25	2.2 ±0.25

Unit Per Reel:
2500pcs

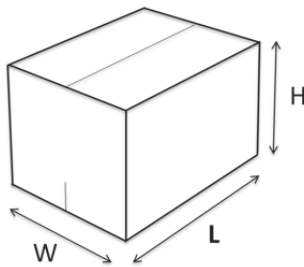


5- Box Dimensions



	Inner BOX, mm
L	365
W	367
H	50

1 Inner box contains
3500 components



	Carton, mm
L	384
W	380
H	273

Each Carton contains 5
boxes,
Total of 12500 components

6- Change Log

Version	Date	Description
01	November 11, 2024	Initial version
02	March 27, 2025	Add Characteristic Curve & Reel Information
03	April 16, 2026	Electrical characteristics revised

- **Note:** GaNrich semiconductor reserves the right to revise products and/or specifications without notice.