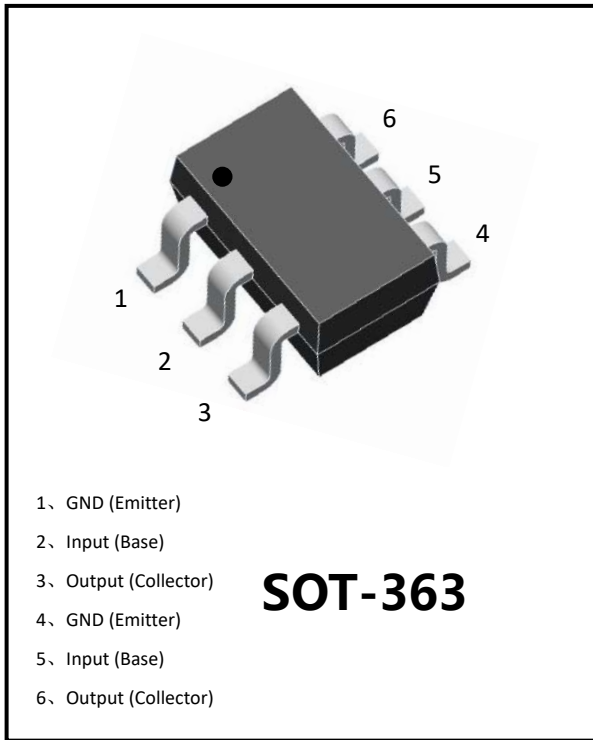


## NPN+PNP Digital Transistors (Built-in Resistors)



### Features

- Epoxy meets UL-94 V-0 flammability rating
- Moisture Sensitivity Level 1
- Built-in bias resistors enable the configuration of an inverter circuit without connecting external input resistors
- Only the on/off conditions need to be set for operation, making the circuit design easy
- Simplifies Circuit Design、 Reduces Board Space、 Reduces Component Count
- Part no. with suffix "Q" means AEC-Q101 qualified

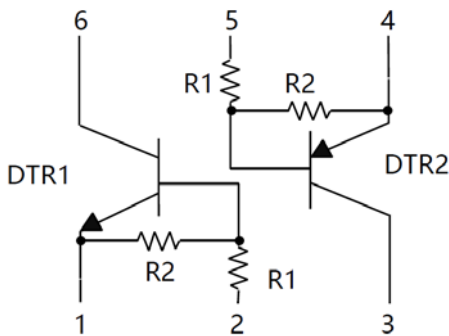
### Application

- Control of IC inputs、 Switching loads、 Digital system

### Mechanical Data

- **Package:** SOT-363
- **Terminals:** Tin plated leads, solderable per J-STD-002 and JESD22-B102
- **Marking:** D12

### Equivalent circuit



### Ordering Information (Example)

PREFERED P/N	PACKING CODE	UNIT WEIGHT(g)	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
UMD12NQ	F2	Approximate 0.009g	3000	30000	120000	7" reel



# UMD12NQ

## ■Maximum Ratings (Ta=25°C Unless otherwise specified)

### DTR1-NPN

ITEM	SYMBOL	UNIT	VALUE
Collector-Emitter Voltage	V <sub>CEO</sub>	V	50
Collector-Base Voltage	V <sub>CBO</sub>	V	50
Emitter-Base Voltage	V <sub>EBO</sub>	V	10
Supply Voltage	V <sub>CC</sub>	V	50
Input Voltage	V <sub>IN</sub>	V	-10 to +40
Output Current	I <sub>C</sub>	mA	100
Power Dissipation (*)	P <sub>D</sub>	mW	150
Thermal Resistance From Junction to Ambient (*)	R <sub>θJA</sub>	°C/W	833
Junction Temperature	T <sub>J</sub>	°C	-55 to +150
Storage Temperature	T <sub>STG</sub>	°C	-55 to +150

### DTR2-PNP

ITEM	SYMBOL	UNIT	VALUE
Collector-Emitter Voltage	V <sub>CEO</sub>	V	-50
Collector-Base Voltage	V <sub>CBO</sub>	V	-50
Emitter-Base Voltage	V <sub>EBO</sub>	V	-10
Supply Voltage	V <sub>CC</sub>	V	-50
Input Voltage	V <sub>IN</sub>	V	-40 to +10
Output Current	I <sub>C</sub>	mA	-100
Power Dissipation (*)	P <sub>D</sub>	mW	150
Thermal Resistance From Junction to Ambient (*)	R <sub>θJA</sub>	°C/W	833
Junction Temperature	T <sub>J</sub>	°C	-55 to +150
Storage Temperature	T <sub>STG</sub>	°C	-55 to +150

(\*) Device mounted on FR-4 PCB 1.0 x 1.0 x 0.06 inch



# UMD12NQ

## ■Electrical Characteristics (Ta=25°C unless otherwise specified)

### DTR1-NPN

ITEM	SYMBOL	UNIT	CONDITIONS	MIN	TYP	MAX
Input voltage	$V_{I(off)}$	V	$V_{CC}=5V, I_O=100\mu A$	0.5	-	-
	$V_{I(on)}$	V	$V_O=0.3V, I_O=2mA$	-	-	3
Output voltage	$V_{O(on)}$	V	$I_O=10mA, I_I=0.5mA$	-	-	0.3
Input current	$I_I$	mA	$V_I=5V$	-	-	0.18
Output current	$I_{O(off)}$	$\mu A$	$V_{CC}=50V, V_I=0$	-	-	0.5
DC current gain	$G_I$		$V_O=5V, I_O=5mA$	68	-	-
Input resistance	$R_1$	k $\Omega$		32.9	47	61.1
Resistance ratio	$R_2/R_1$			0.8	1	1.2
Transition frequency	$f_T$	MHz	$V_{CE}=10V, I_C=5mA, f=100MHz$	-	250	-

### DTR2-PNP

ITEM	SYMBOL	UNIT	CONDITIONS	MIN	TYP	MAX
Input voltage	$V_{I(off)}$	V	$V_{CC}=-5V, I_O=-100\mu A$	-0.5	-	-
	$V_{I(on)}$	V	$V_O=-0.3V, I_O=-2mA$	-	-	-3
Output voltage	$V_{O(on)}$	V	$I_O=-10mA, I_I=-0.5mA$	-	-	-0.3
Input current	$I_I$	mA	$V_I=-5V$	-	-	-0.18
Output current	$I_{O(off)}$	$\mu A$	$V_{CC}=-50V, V_I=0$	-	-	-0.5
DC current gain	$G_I$		$V_O=-5V, I_O=-5mA$	68	-	-
Input resistance	$R_1$	k $\Omega$		32.9	47	61.1
Resistance ratio	$R_2/R_1$			0.8	1	1.2
Transition frequency	$f_T$	MHz	$V_{CE}=-10V, I_C=-5mA, f=100MHz$	-	250	-



## ■ DTR1 NPN Characteristics (Typical)

Fig.1 - ON Characteristics

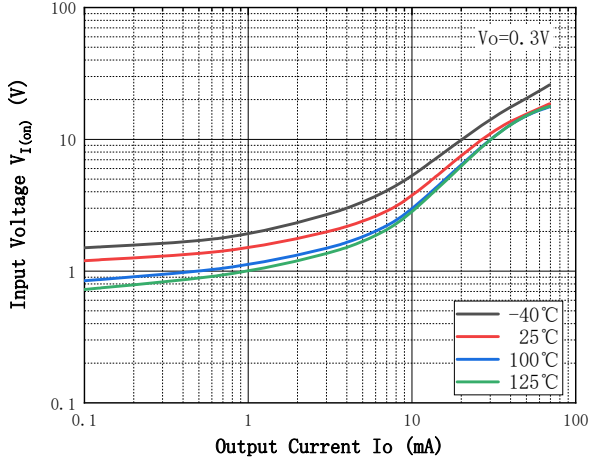


Fig.2 - OFF Characteristics

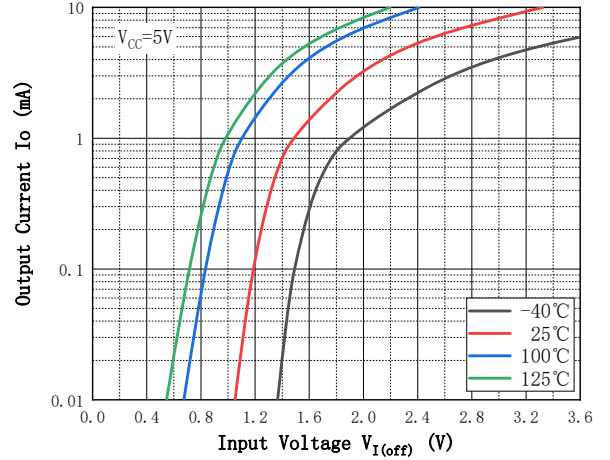


Fig.3 - Output Voltage Characteristics

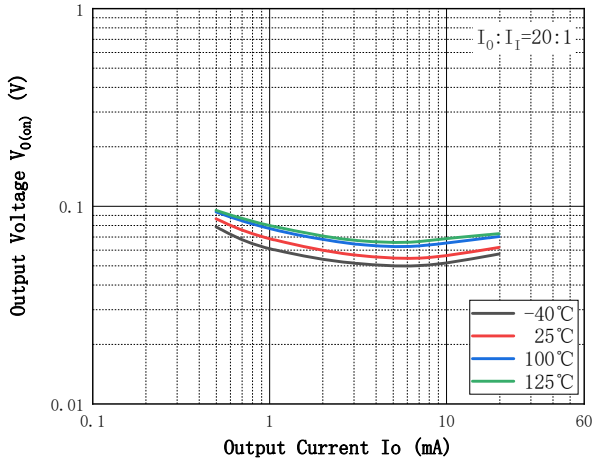


Fig.4 - DC Current Gain Characteristics

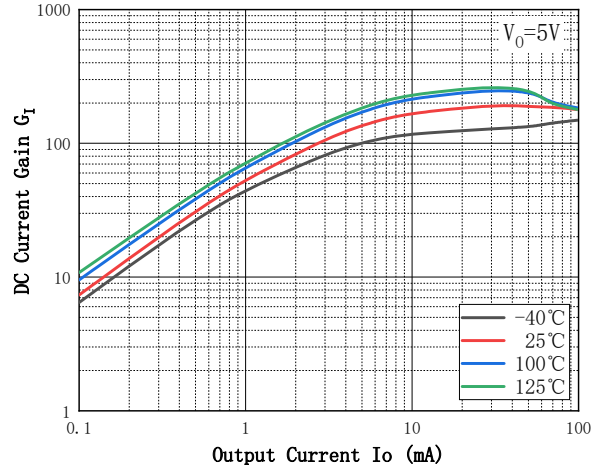


Fig.5 -  $C_o - V_{CB}$

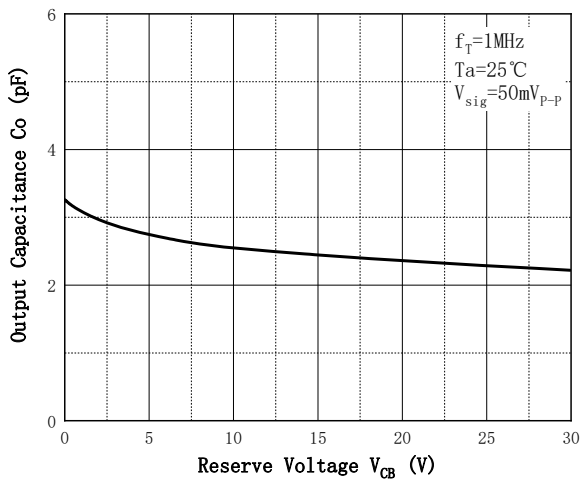
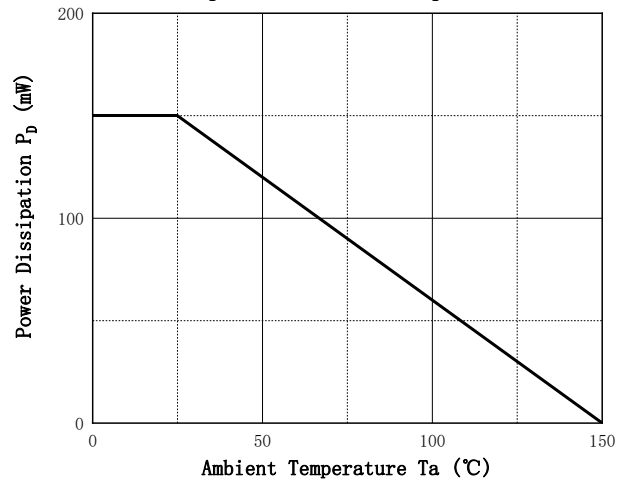


Fig.6 - Power Derating Curve





## ■ DTR2 PNP Characteristics (Typical)

Fig.1 - ON Characteristics

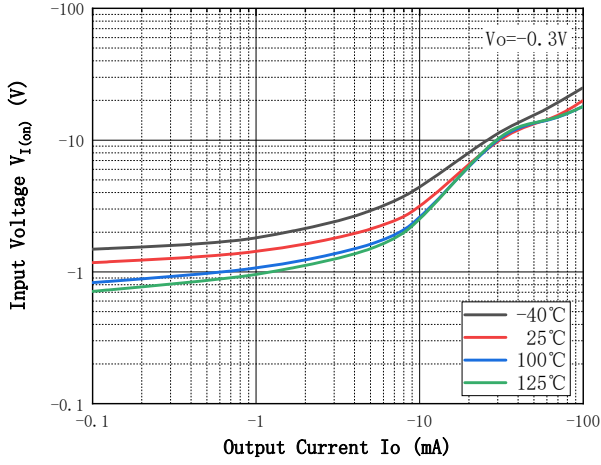


Fig.2 - OFF Characteristics

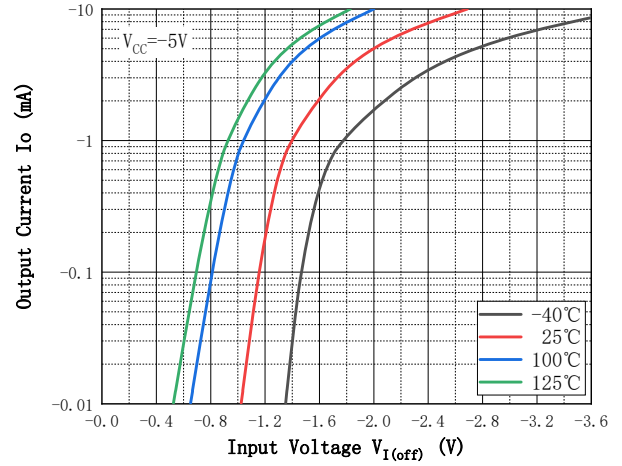


Fig.3 - Output Voltage Characteristics

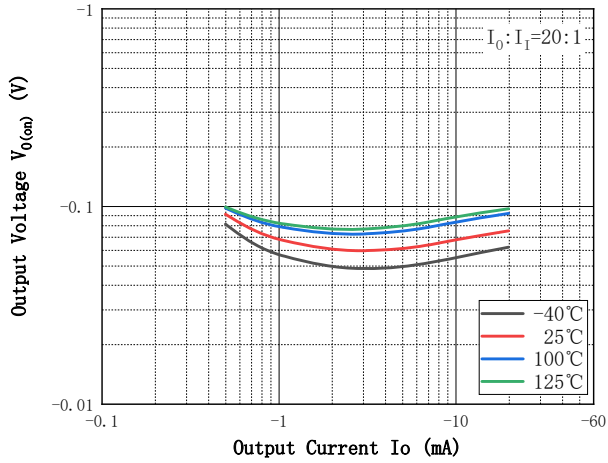


Fig.4 - DC Current Gian Characteristics

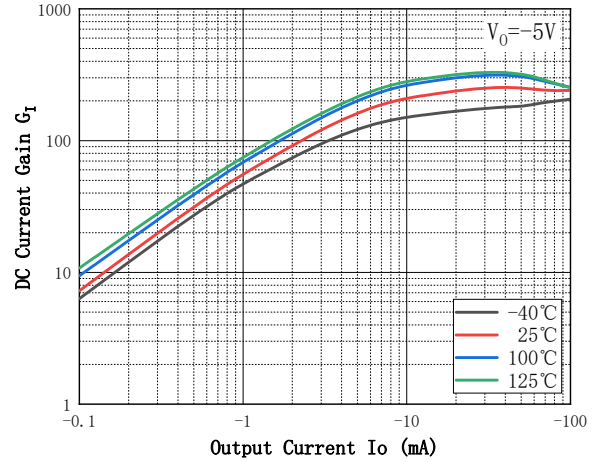


Fig.5 -  $C_o - V_{CB}$

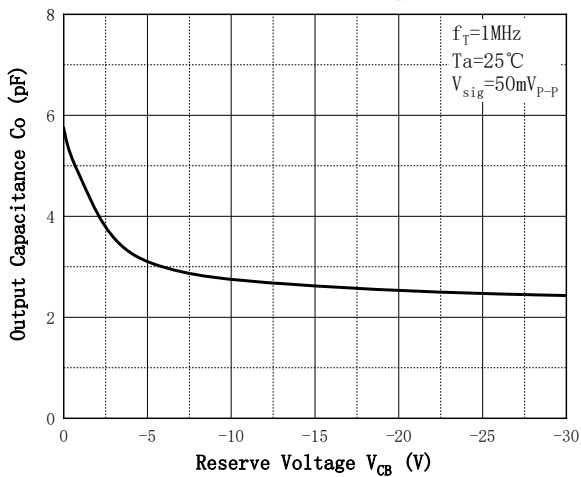
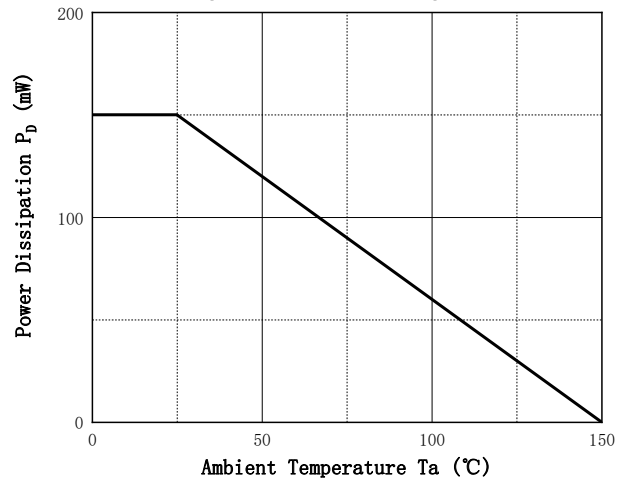


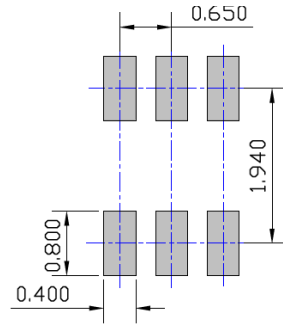
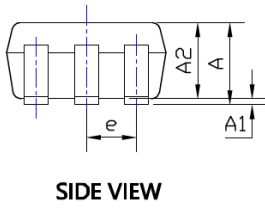
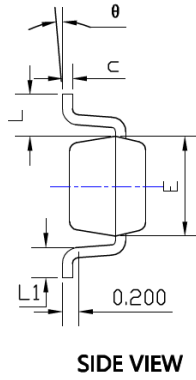
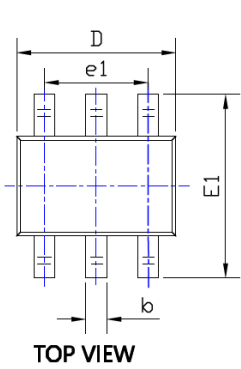
Fig.6 - Power Derating Curve





# UMD12NQ

## ■SOT-363 Package Outline Dimensions & Suggested Pad Layout



UNIT: mm

SUGGESTED SOLDER PAD LAYOUT

SYMBOL	DIMENSIONS			
	INCHES		Millimeter	
	MIN.	MAX.	MIN.	MAX.
A	0.035	0.043	0.900	1.100
A1	0.000	0.004	0.000	0.100
A2	0.035	0.039	0.900	1.000
b	0.006	0.014	0.150	0.350
c	0.004	0.010	0.100	0.250
D	0.071	0.087	1.800	2.200
E	0.045	0.053	1.150	1.350
E1	0.085	0.096	2.150	2.450
e	0.026TYP		0.650TYP	
e1	0.047	0.055	1.200	1.400
L	0.021REF		0.525REF	
L1	0.010	0.018	0.260	0.460
theta	0°	8°	0°	8°

**NOTE:**

1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.
2. TOLERANCE 0.1mm UNLESS OTHERWISE SPECIFIED.
3. THE PAD LAYOUT IS FOR REFERENCE PURPOSES ONLY.



## UMD12NQ

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