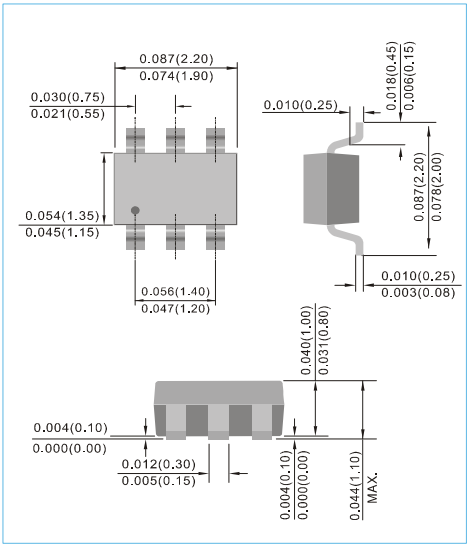
MMDT3946

COMPLEMENTARY NPN/PNP GENERAL PURPOSE SWITCHING TRANSISTOR

VOLTAGE 40 Volt **POWER** 225 mWatt

SOT-363 Unit : inch(mm)

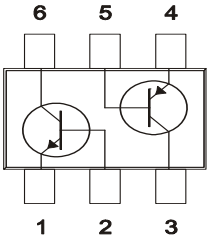


FEATURES

- Epitaxial silicon, planar design
- Collector-emitter voltage V_{CE} = 40V
- Collector current Ic = 200mA
- Transition Frequency> 300MHz f_T@I_C=10mA,V_{CE}=20V, f=100MHz
- Lead free in compliance with EU RoHS 2011/65/EU directive
- Green molding compound as per IEC61249 Std. . (Halogen Free)

MECHANICAL DATA

- Case: SOT-363, Plastic
- Terminals: Solderable per MIL-STD-750, Method 2026
- Approx. Weight: 0.0002 ounces, 0.006 grams
- Marking: S3A



ABSOLUTE RATINGS

ABSOLUTE RATING		NPN 3904 SECTION	PNP 3906 SECTION	-
PARAMETER	SYMBOL	VALUE	VALUE	UNITS
Collector - Emitter Voltage	V_{CEO}	40	-40	V
Collector - Base Voltage	V_{CBO}	60	-40	V
Emitter - Base Voltage	V_{EBO}	6	-5	V
Collector Current - Continuous	I_C	200	-200	mA

THERMAL CHARACTERISTICS

PARAMETER	SYMBOL	VALUE	UNITS
Max Power Dissipation (Note 1)	P_{TOT}	225	mW
Thermal Resistance , Junction to Ambient	$R_{\theta JA}$	625	^{O}C/W
Junction Temperature	T_J	-55 to 150	^{O}C
Storage Temperature	T_{STG}	-55 to 150	^{O}C

Note 1: Transistor mounted on FR-5 board 1 x 0.75 x 0.062 in.

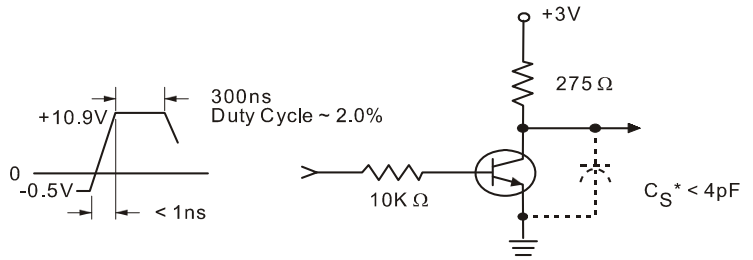
MMDT3946

ELECTRICAL CHARACTERISTICS NPN SECTION

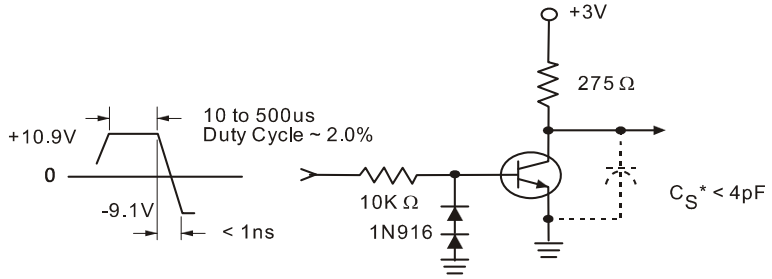
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNITS
Collector - Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C=1.0mA, I_B=0	40	-	-	V
Collector - Base Breakdown Voltage	$V_{(BR)CBO}$	I_C=10uA, I_E=0	60	-	-	V
Emitter - Base Breakdown Voltage	$V_{(BR)EBO}$	I_E=10uA, I_C=0	6.0	-	-	V
Base Cutoff Current	I_{BI}	V_{CE}=30V, V_{EB}=3.0V	-	-	50	nA
Collector Cutoff Current	I_{CEX}	V_{CE}=30V, V_{EB}=3.0V	-	-	50	nA
DC Current Gain (Note 2)	h_{FE}	I_C=0.1mA, V_{CE}=1.0V I_C=1.0mA, V_{CE}=1.0V I_C=10mA, V_{CE}=1.0V I_C=50mA, V_{CE}=1.0V I_C=100mA, V_{CE}=1.0V	40 70 100 60 30	- - - - -	- - 300 - -	-
Collector - Emitter Saturation Voltage (Note 2)	$V_{CE(SAT)}$	I_C=10mA, I_B=1.0mA I_C=50mA, I_B=5.0mA	-	-	0.2 0.3	V
Base - Emitter Saturation Voltage (Note 2)	$V_{BE(SAT)}$	I_C=10mA, I_B=1.0mA I_C=50mA, I_B=5.0mA	0.65 -	- -	0.85 0.95	V
Collector - Base Capacitance	C_{CBO}	V_{CB}=5V, I_E=0, f=1MHz	-	-	4.0	pF
Emitter - Base Capacitance	C_{EBO}	V_{CB}=0.5V, I_C=0, f=1MHz	-	-	8.0	pF
Delay Time	td	V_{CC}=3V,V_{BE}=-0.5V, I_C=10mA,I_B=1.0mA	-	-	35	ns
Rise Time	tr	V_{CC}=3V,V_{BE}=-0.5V, I_C=10mA,I_B=1.0mA	-	-	35	ns
Storage Time	ts	V_{CC}=3V,I_C=10mA I_{B1}=I_{B2}=1.0mA	-	-	200	ns
Fall Time	tf	V_{CC}=3V,I_C=10mA I_{B1}=I_{B2}=1.0mA	-	-	50	ns

Note 2: Pulse Test: Pulse Width < 300 us, Duty Cycle < 2.0%.

SWITCHING TIME EQUIVALENT TEST CIRCUITS



Delay and Rise Time Equivalent Test Circuit



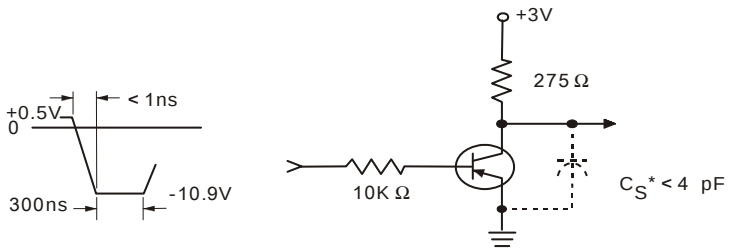
Storage and Fall Time Equivalent Test Circuit

MMDT3946

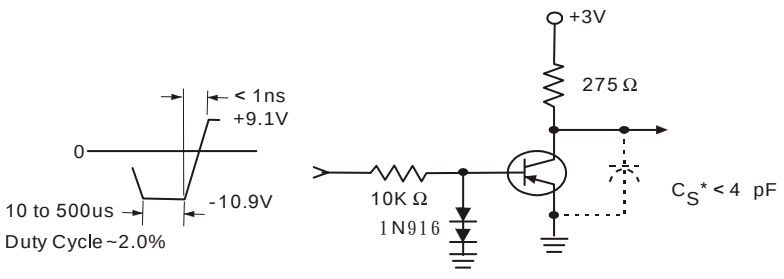
ELECTRICAL CHARACTERISTICS PNP SECTION

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNITS
Collector - Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C=-1.0mA, I_B=0	-40	-	-	V
Collector - Base Breakdown Voltage	$V_{(BR)CBO}$	I_C=-10uA, I_E=0	-40	-	-	V
Emitter - Base Breakdown Voltage	$V_{(BR)EBO}$	I_E=-10uA, I_C=0	-5.0	-	-	V
Base Cutoff Current	I_{BI}	V_{CE}=-30V, V_{EB}=-3.0V	-	-	-50	nA
Collector Cutoff Current	I_{CEX}	V_{CE}=-30V, V_{EB}=-3.0V	-	-	-50	nA
DC Current Gain (Note 2)	h_{FE}	I_C=-0.1mA, V_{CE}=-1.0V I_C=-1.0mA, V_{CE}=-1.0V I_C=-10mA, V_{CE}=-1.0V I_C=-50mA, V_{CE}=-1.0V I_C=-100mA, V_{CE}=-1.0V	60 80 100 60 30	- - - - -	- - 300 - -	-
Collector - Emitter Saturation Voltage (Note 2)	$V_{CE(SAT)}$	I_C=-10mA, I_B=-1.0mA I_C=-50mA, I_B=-5.0mA	-	-	-0.25 -0.4	V
Base - Emitter Saturation Voltage (Note 2)	$V_{BE(SAT)}$	I_C=-10mA, I_B=-1.0mA I_C=-50mA, I_B=-5.0mA	-0.65 -	- -	-0.85 -0.95	V
Collector - Base Capacitance	C_{CBO}	V_{CB}=-5V, I_E=0, f=1MHz	-	-	4.0	pF
Emitter - Base Capacitance	C_{EBO}	V_{CB}=-0.5V, I_C=0, f=1MHz	-	-	10	pF
Delay Time	td	V_{CC}=-3V,V_{BE}=-0.5V, I_C=-10mA,I_B=-1.0mA	-	-	35	ns
Rise Time	tr	V_{CC}=-3V,V_{BE}=-0.5V, I_C=-10mA,I_B=-1.0mA	-	-	35	ns
Storage Time	ts	V_{CC}=-3V,I_C=-10mA I_{B1}=I_{B2}=-1.0mA	-	-	225	ns
Fall Time	tf	V_{CC}=-3V,I_C=-10mA I_{B1}=I_{B2}=1.0mA	-	-	75	ns

SWITCHING TIME EQUIVALENT TEST CIRCUITS



Delay and Rise Time Equivalent Test Circuit



Storage and Fall Time Equivalent Test Circuit

MMDT3946

ELECTRICAL CHARACTERISTICS CURVE NPN SECTION

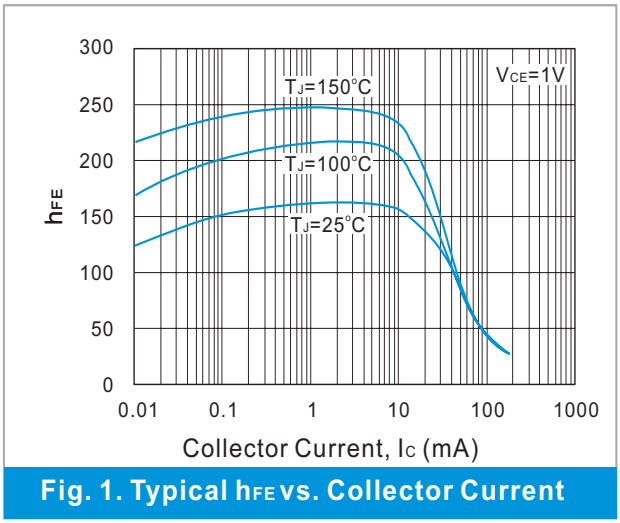


Fig. 1. Typical h_{FE} vs. Collector Current

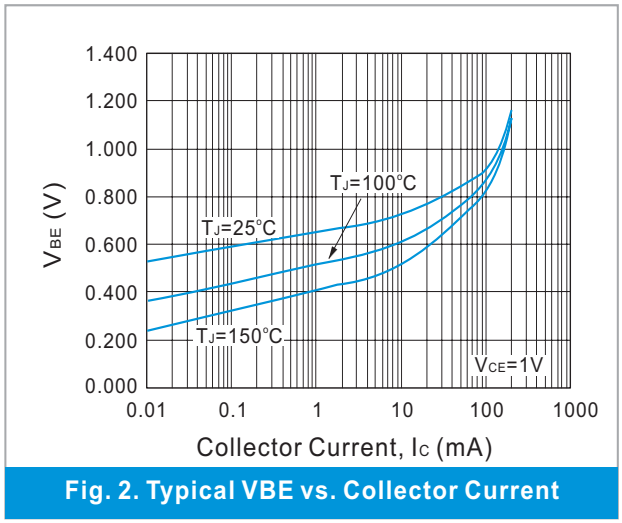


Fig. 2. Typical VBE vs. Collector Current

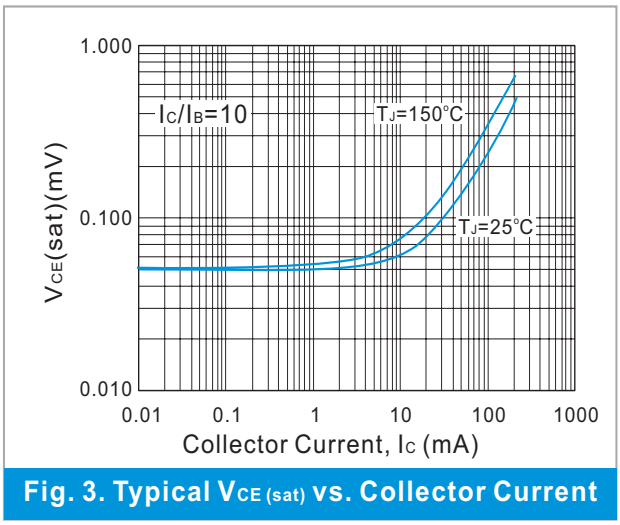


Fig. 3. Typical $V_{CE\ (sat)}$ vs. Collector Current

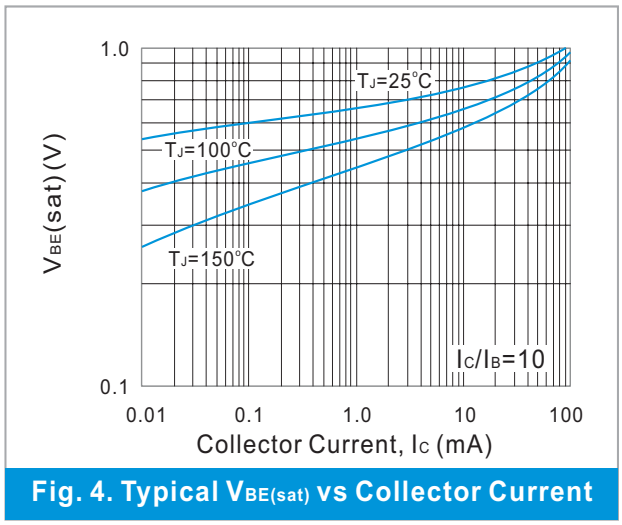


Fig. 4. Typical $V_{BE(sat)}$ vs Collector Current

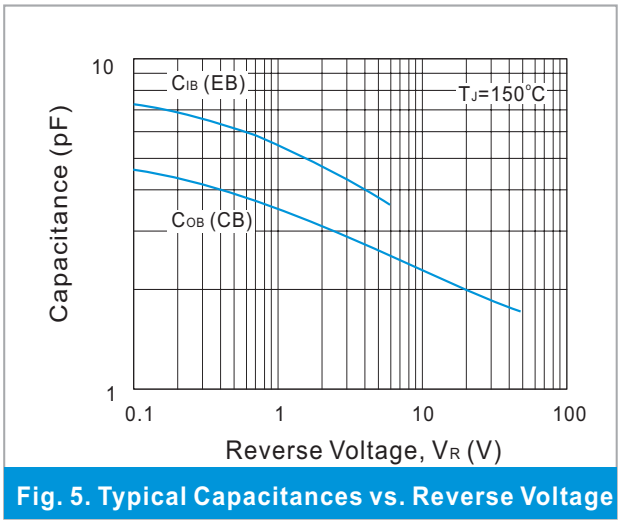


Fig. 5. Typical Capacitances vs. Reverse Voltage

MMDT3946

ELECTRICAL CHARACTERISTICS CURVE PNP SECTION

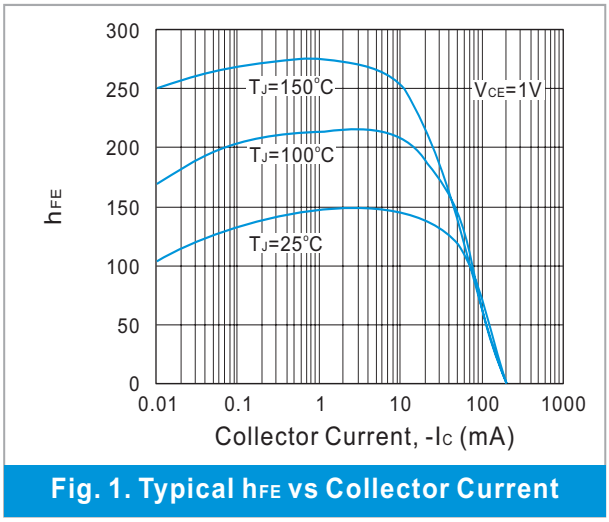


Fig. 1. Typical h_{FE} vs Collector Current

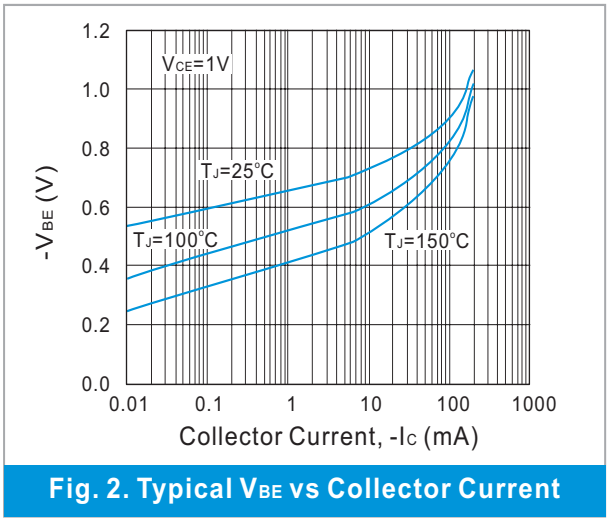


Fig. 2. Typical V_{BE} vs Collector Current

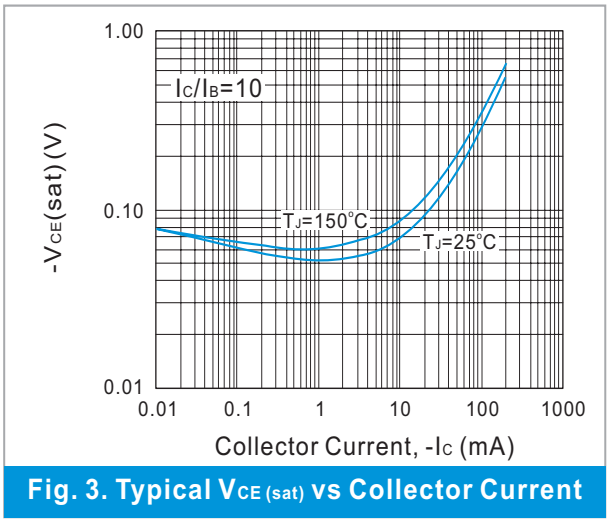


Fig. 3. Typical $V_{CE\,(sat)}$ vs Collector Current

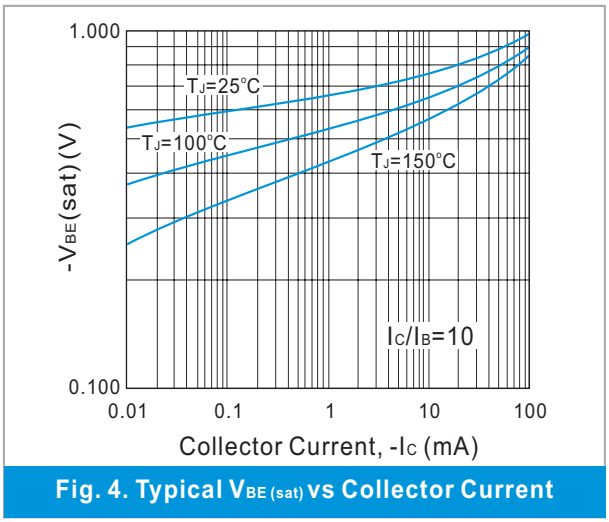


Fig. 4. Typical $V_{BE\,(sat)}$ vs Collector Current

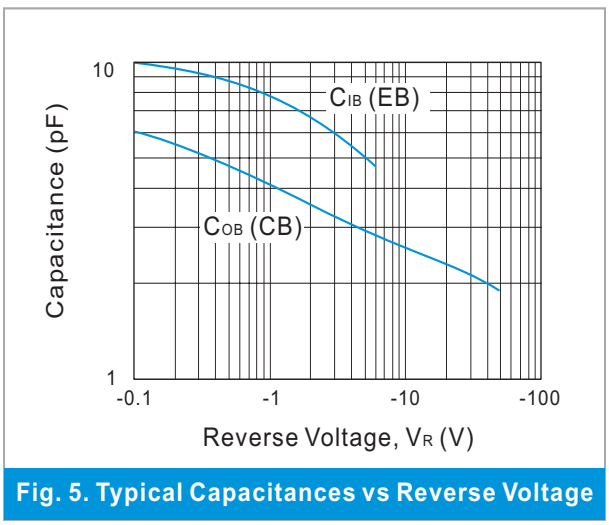
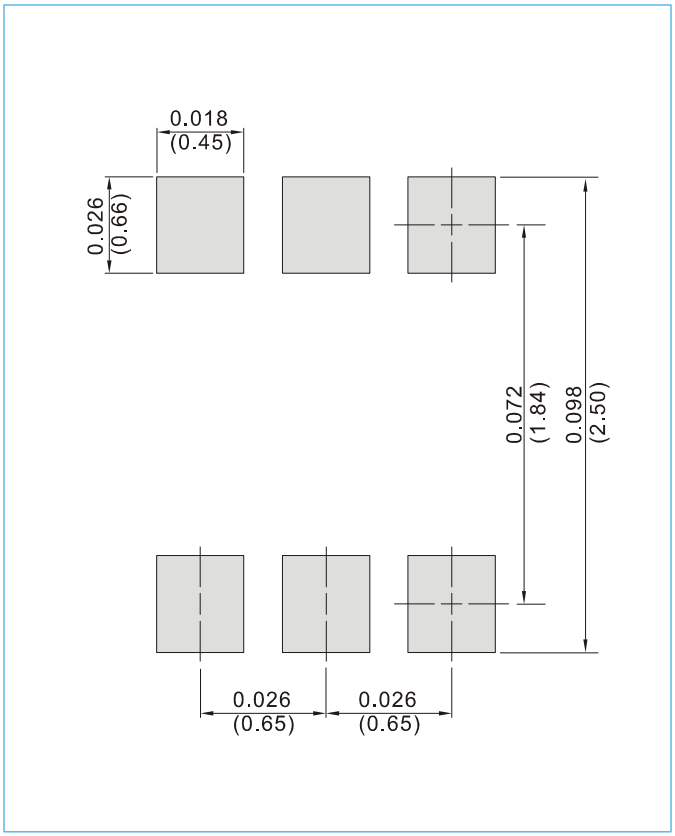


Fig. 5. Typical Capacitances vs Reverse Voltage

MMDT3946

MOUNTING PAD LAYOUT

SOT-363 Unit : inch(mm)



ORDER INFORMATION

- Packing information

  T/R - 10K per 13" plastic Reel

  T/R - 3K per 7" plastic Reel

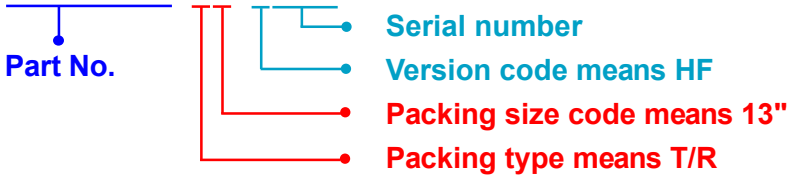
MMDT3946

Part No_packing code_Version

MMDT3946_R1_00001
MMDT3946_R2_00001

For example :

RB500V-40_R2_00001



Packing Code XX				Version Code XXXXX		
Packing type	1st Code	Packing size code	2nd Code	HF or RoHS	1st Code	2nd~5th Code
Tape and Ammunition Box (T/B)	A	N/A	0	HF	0	serial number
Tape and Reel (T/R)	R	7"	1	RoHS	1	serial number
Bulk Packing (B/P)	B	13"	2			
Tube Packing (T/P)	T	26mm	X			
Tape and Reel (Right Oriented) (TRR)	S	52mm	Y			
Tape and Reel (Left Oriented) (TRL)	L	PANASERT T/B CATHODE UP (PBCU)	U			
FORMING	F	PANASERT T/B CATHODE DOWN (PBCD)	D			

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