



MMDT3946

DUAL TRANSISTOR

COMPLEMENTARY NPN/PNP SMALL SIGNAL SURFACE MOUNT TRANSISTOR

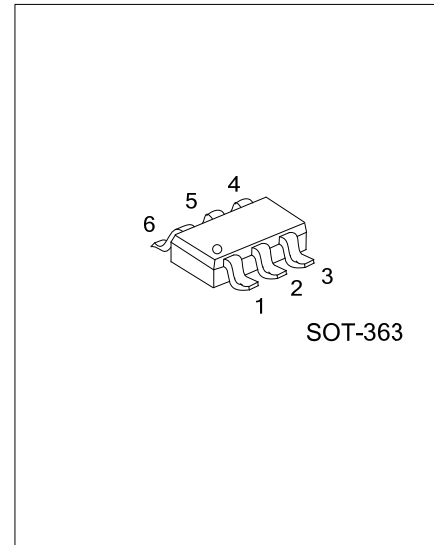
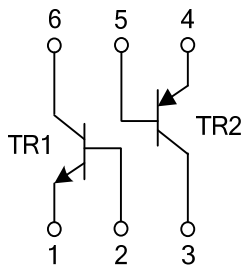
DESCRIPTION

The UTC **MMDT3946** is a complementary NPN/PNP small signal surface mount transistor. It's suitable for low power amplification and switch.

FEATURES

- * Epitaxial Planar Die Construction
- * Extremely-Small Surface Mount Package

EQUIVALENT CIRCUIT

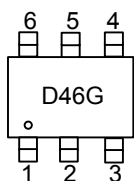


ORDERING INFORMATION

Ordering Number	Package	Pin Assignment						Packing
		1	2	3	4	5	6	
MMDT3946G-AL6-R	SOT-363	E1	B1	C2	E2	B2	C1	Tape Reel

MMDT3946G-AL6-R	(1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) AL6: SOT-363 (3) G: Halogen Free and Lead Free
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MARKING



■ ABSOLUTE MAXIMUM RATINGS ($T_A=25^{\circ}\text{C}$, unless otherwise specified.)

TR1

PARAMETER	SYMBOL	RATINGS	UNIT
Collector-Base Voltage	V_{CBO}	60	V
Collector-Emitter Voltage	V_{CEO}	40	V
Emitter-Base Voltage	V_{EBO}	6.0	V
Collector Current-Continuous	I_C	200	mA
Power Dissipation	P_D	200	mW
Junction Temperature	T_J	+150	$^{\circ}\text{C}$
Storage Temperature	T_{STG}	-55~+150	$^{\circ}\text{C}$

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

TR2

PARAMETER	SYMBOL	RATINGS	UNIT
Collector-Base Voltage	V_{CBO}	-40	V
Collector-Emitter Voltage	V_{CEO}	-40	V
Emitter-Base Voltage	V_{EBO}	-5.0	V
Collector Current-Continuous	I_C	-200	mA
Power Dissipation	P_D	200	mW
Junction Temperature	T_J	+150	$^{\circ}\text{C}$
Storage Temperature	T_{STG}	-55~+150	$^{\circ}\text{C}$

■ THERMAL DATA ($T_A=25^{\circ}\text{C}$, unless otherwise specified.)

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	625	$^{\circ}\text{C/W}$

■ ELECTRICAL CHARACTERISTICS ($T_A=25^\circ\text{C}$, unless otherwise specified.)

TR1

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS (Note)						
Collector-Base Breakdown Voltage	V _{CBO}	I _C =10μA, I _E =0	60			V
Collector-Emitter Breakdown Voltage	V _{CEO}	I _C =1mA, I _B =0 (Note)	40			V
Emitter-Base Breakdown Voltage	V _{EBO}	I _E =10μA, I _C =0	6			V
Collector Cutoff Current	I _{CEX}	V _{CE} =30V, V _{EB} =3V			50	nA
Base Cutoff Current	I _{BL}	V _{CE} =30V, V _{EB} =3V			50	nA
ON CHARACTERISTICS (Note)						
DC Current Gain	h _{FE1}	V _{CE} =1V, I _C =0.1mA	40			
	h _{FE2}	V _{CE} =1V, I _C =1mA	70			
	h _{FE3}	V _{CE} =1V, I _C =10mA	100		300	
	h _{FE4}	V _{CE} =1V, I _C =50mA	60			
	h _{FE5}	V _{CE} =1V, I _C =100mA	30			
Collector-Emitter Saturation Voltage (Note)	V _{CE(SAT)1}	I _C =10mA, I _B =1mA			0.2	V
	V _{CE(SAT)2}	I _C =50mA, I _B =5mA			0.3	
Base-Emitter Saturation Voltage (Note)	V _{BE(SAT)1}	I _C =10mA, I _B =1mA	0.65		0.85	V
	V _{BE(SAT)2}	I _C =50mA, I _B =5mA			0.95	
SMALL SIGNAL CHARACTERISTICS						
Output Capacitance	C _{OB}	V _{CB} =5V, I _E =0, f=1MHz			4	pF
Current Gain-Bandwidth Product	f _T	V _{CE} =20V, I _C =10mA, f=100MHz	300			MHz
SWITCHING CHARACTERISTICS						
Turn On Time	t _{ON}	V _{CC} =3V, V _{BE} =0.5V, I _C =10mA, I _{B1} =1mA			70	ns
Turn Off Time	t _{OFF}	I _{B1} =I _{B2} =1mA			250	ns

Note: Pulse test: $P_W \leq 300\mu\text{s}$, Duty Cycle $\leq 2.0\%$

TR2

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS (Note 1)						
Collector-Base Breakdown Voltage	V _{CBO}	I _C =-10μA, I _E =0	-40			V
Collector-Emitter Breakdown Voltage	V _{CEO}	I _C =-1mA, I _B =0	-40			V
Emitter-Base Breakdown Voltage	V _{EBO}	I _E =-10μA, I _C =0	-5			V
Collector Cutoff Current	I _{CEX}	V _{CE} =-30V, V _{EB} =-3V			-50	nA
Base Cutoff Current	I _{BL}	V _{CE} =-30V, V _{EB} =-3V			-50	nA
ON CHARACTERISTICS (Note 1)						
DC Current Gain	h _{FE1}	V _{CE} =-1V, I _C =-0.1mA	60			
	h _{FE2}	V _{CE} =-1V, I _C =-1mA	80			
	h _{FE3}	V _{CE} =-1V, I _C =-10mA	100		300	
	h _{FE4}	V _{CE} =-1V, I _C =-50mA	60			
	h _{FE5}	V _{CE} =-1V, I _C =-100mA	30			
Collector-Emitter Saturation Voltage (Note)	V _{CE(SAT)1}	I _C =-10mA, I _B =-1mA			-0.25	V
	V _{CE(SAT)2}	I _C =-50mA, I _B =-5mA			-0.4	
Base-Emitter Saturation Voltage	V _{BE(SAT)1}	I _C =-10mA, I _B =-1mA	-0.65		-0.85	V
	V _{BE(SAT)2}	I _C =-50mA, I _B =-5mA			-0.95	
SMALL SIGNAL CHARACTERISTICS						
Output Capacitance	C _{ob}	V _{CB} =-5V, I _E =0, f=1MHz			4.5	pF
Transition Voltage	f _T	V _{CE} =-20V, I _C =-10mA, f=100MHz	250			MHz
SWITCHING CHARACTERISTICS						
Turn on Time	t _{ON}	V _{CC} =-3V, V _{BE} =-0.5V, I _C =-10mA, I _{B1} =-1mA			70	ns
Turn off Time	t _{OFF}	I _{B1} =1B ₂ =-1mA			300	ns

Note: Pulse test: $P_W \leq 300\mu\text{s}$, Duty Cycle $\leq 2.0\%$

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