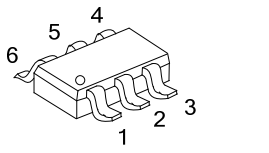
MMDT3946

DUAL TRANSISTOR

COMPLEMENTARY NPN/PNP SMALL SIGNAL SURFACE MOUNT TRANSISTOR



SOT-363

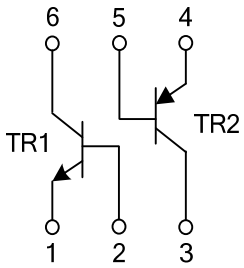
■ DESCRIPTION

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



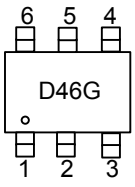
■ ORDERING INFORMATION

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

■ MARKING



■ ABSOLUTE MAXIMUM RATINGS (T_A=25°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	°C
Storage Temperature	T_{STG}	-55~+150	°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	°C
Storage Temperature	T_{STG}	-55~+150	°C

■ THERMAL DATA (T_A=25°C, unless otherwise specified.)

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	625	°C/W

■ ELECTRICAL CHARACTERISTICS (T_A=25°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	$h_{FE}1$	V_{CE}=1V, I_C=0.1mA	40			
	$h_{FE}2$	V_{CE}=1V, I_C=1mA	70			
	$h_{FE}3$	V_{CE}=1V, I_C=10mA	100		300	
	$h_{FE}4$	V_{CE}=1V, I_C=50mA	60			
	$h_{FE}5$	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=1_B2=1mA			250	ns

Note: Pulse test: P_W ≤ 300μs, Duty Cycle ≤ 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}=1_{B2}=-1mA			300	ns

Note: Pulse test: P_W ≤ 300μs, Duty Cycle ≤ 2.0%