



YOUSHANG SEMICONDUCTOR

设计研发新型功率器件

各类小信号开关

中低压及高压大电流等场效应管

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Features

- NPN + PNP Combination
- $BV_{CEO} > 30$ (-30)V
- $BV_{CEV} > 40$ (-40)V
- $I_{CM} = 5$ (-5)A Peak Pulse Current

Description

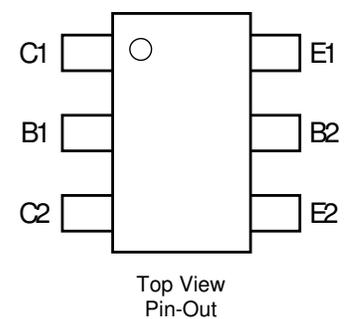
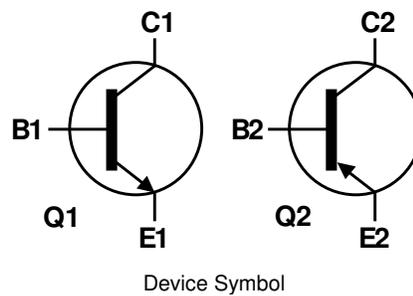
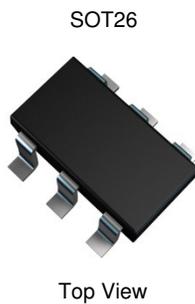
Advanced process capability is used to achieve this high performance device. Combining NPN and PNP transistors, the SOT26 package provides a compact solution for the intended applications.

Mechanical Data

- Case: SOT26
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads; Solderable per MIL-STD-202, Method 208 [Ⓔ]
- Weight: 0.015 grams (Approximate)

Applications

- MOSFET and IGBT Gate Driving
- Motor Drive



Absolute Maximum Ratings – Q1 (NPN Transistor) (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V _{CBO}	40	V
Collector-Emitter Voltage	V _{CEV}	40	V
Collector-Emitter Voltage	V _{CEO}	30	V
Emitter-Base Voltage	V _{EBO}	7	V
Continuous Collector Current	I _C	1.5	A
Peak Pulsed Collector Current	I _{CM}	5	A
Base Current	I _B	1	A

Absolute Maximum Ratings – Q2 (PNP Transistor) (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V _{CBO}	-40	V
Collector-Emitter Voltage	V _{CEV}	-40	V
Collector-Emitter Voltage	V _{CEO}	-30	V
Emitter-Base Voltage	V _{EBO}	-7	V
Continuous Collector Current	I _C	-1.5	A
Peak Pulsed Collector Current	I _{CM}	-5	A
Base Current	I _B	-1	A

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

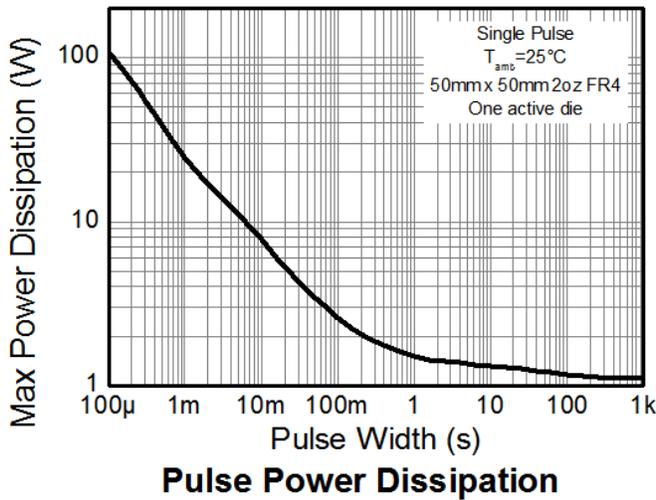
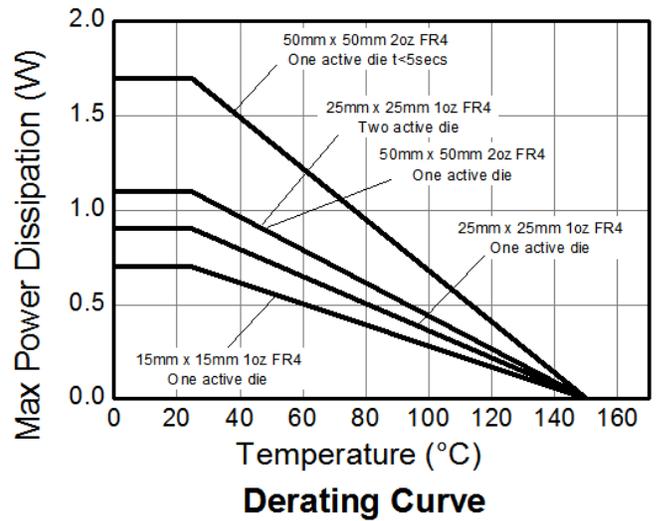
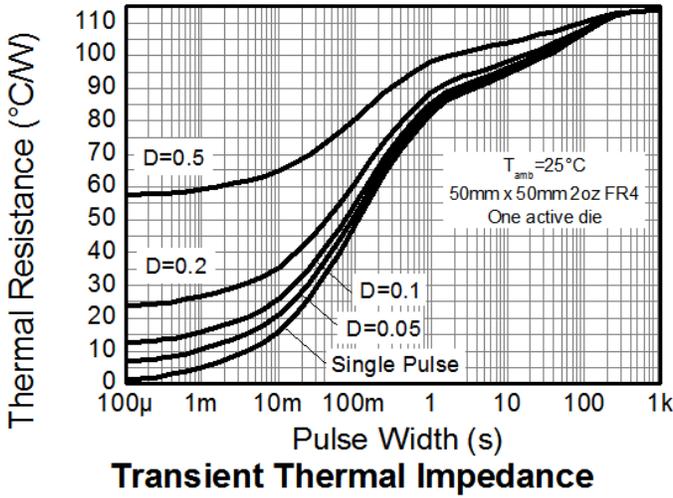
Characteristic	Symbol	Value	Unit	
Power Dissipation Linear Derating Factor	P _D	0.7	W mW/°C	
		(Notes 6 & 10)		5.6
		(Notes 7 & 10)		0.9
		(Notes 7 & 11)		7.2
		(Notes 8 & 10)		1.1
		(Notes 9 & 10)		8.8
Thermal Resistance, Junction to Ambient	R _{θJA}	1.1	°C/W	
		(Notes 6 & 10)		8.8
		(Notes 7 & 10)		179
		(Notes 7 & 11)		139
		(Notes 8 & 10)		113
Thermal Resistance, Junction to Lead	R _{θJL}	(Notes 9 & 10)	113	
		(Note 12)	73	
Operating and Storage Temperature Range	T _J , T _{STG}	95.50	°C	
		-55 to +150		

ESD Ratings (Note 13)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- Notes:
- For a device surface mounted on 15mm x 15mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
 - Same as Note 6, except the device is surface mounted on 25mm x 25mm 1oz copper.
 - Same as Note 6, except the device is surface mounted on 50mm x 50mm 2oz copper.
 - Same as Note 8, except the device is measured at t < 5 seconds.
 - For device with one active die, both collectors attached to a common heatsink.
 - For device with two active die running at equal power, split heatsink 50% to each collector.
 - Thermal resistance from junction to solder-point (at the end of the collector lead).
 - Refer to JEDEC specification JESD22-A114 and JESD22-A115.

Thermal Characteristics and Derating Information



Electrical Characteristics – Q1 (NPN Transistor) (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

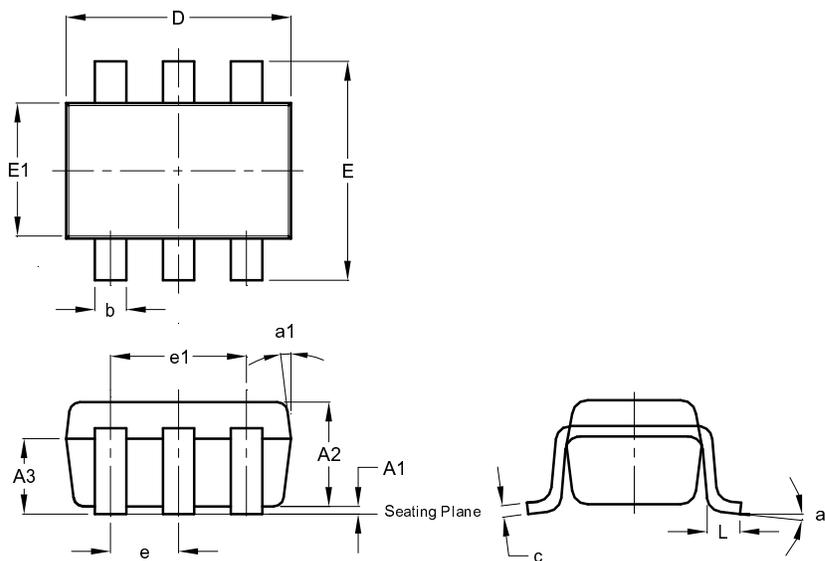
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	BV_{CBO}	40	-	—	V	$I_C = 100\mu\text{A}, I_E = 0$
Collector-Emitter Breakdown Voltage	BV_{CEV}	40	-	—	V	$I_C = 1\mu\text{A}, 0.25\text{V} > V_{BE} > 1.0\text{V}$
Collector-Emitter Breakdown Voltage (Note 14)	BV_{CEO}	30	-	—	V	$I_C = 10\text{mA}, I_B = 0$
Emitter-Base Breakdown Voltage	BV_{EBO}	7	8.3	—	V	$I_E = 100\mu\text{A}, I_C = 0$
Collector Cut-Off Current	I_{CBO}	—	<1	20	nA	$V_{CB} = 32\text{V}$
Collector Cut-Off Current	$I_{CES/R}$	—	<1	20	nA	$V_{CE} = 16\text{V}, R \leq 1\text{k}\Omega$
Emitter Cut-Off Current	I_{EBO}	—	<1	20	nA	$V_{EB} = 6\text{V}$
ON CHARACTERISTICS (Note 14)						
DC Current Gain	h_{FE}	180	300	500	—	$I_C = 100\text{mA}, V_{CE} = 2\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	—	375	mV	$I_C = 750\text{mA}, I_B = 15\text{mA}$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	—	—	1,200	mV	$I_C = 750\text{mA}, I_B = 15\text{mA}$
SMALL SIGNAL CHARACTERISTICS						
Output Capacitance	C_{obo}	—	9	20	pF	$V_{CB} = 10\text{V}, f = 1.0\text{MHz}$
Current Gain-Bandwidth Product	f_T	—	265	—	MHz	$V_{CE} = 10\text{V}, I_C = 50\text{mA}, f = 100\text{MHz}$
Delay Time	t_d	—	10	—	ns	$V_{CC} = 10\text{V}, I_C = 1\text{A}$ $I_{B1} = -I_{B2} = 50\text{mA}$
Rise Time	t_r	—	12	—	ns	
Storage Time	t_s	—	185	—	ns	
Fall Time	t_f	—	45	—	ns	

Electrical Characteristics – Q2 (PNP Transistor) (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	BV_{CBO}	-40	-	—	V	$I_C = -100\mu\text{A}, I_E = 0$
Collector-Emitter Breakdown Voltage	BV_{CEV}	-40	-	—	V	$I_C = -1\mu\text{A}, 0.25\text{V} < V_{BE} < 1.0\text{V}$
Collector-Emitter Breakdown Voltage (Note 14)	BV_{CEO}	-30	-	—	V	$I_C = -10\text{mA}, I_B = 0$
Emitter-Base Breakdown Voltage	BV_{EBO}	-7	-8.3	—	V	$I_E = -100\mu\text{A}, I_C = 0$
Collector Cut-Off Current	I_{CBO}	—	<-1	-20	nA	$V_{CB} = -32\text{V}$
Collector Cut-Off Current	$I_{CES/R}$	—	<-1	-20	nA	$V_{CE} = -16\text{V}, R \leq 1\text{k}\Omega$
Emitter Cut-Off Current	I_{EBO}	—	<-1	-20	nA	$V_{EB} = -6\text{V}$
ON CHARACTERISTICS (Note 14)						
DC Current Gain	h_{FE}	180	300	500	—	$I_C = -100\text{mA}, V_{CE} = -2\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	—	-375	mV	$I_C = -750\text{mA}, I_B = -15\text{mA}$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	—	—	-1,200	mV	$I_C = -750\text{mA}, I_B = -15\text{mA}$
SMALL SIGNAL CHARACTERISTICS						
Output Capacitance	C_{obo}	—	9	20	pF	$V_{CB} = -10\text{V}, f = 1.0\text{MHz}$
Current Gain-Bandwidth Product	f_T	—	195	—	MHz	$V_{CE} = -10\text{V}, I_C = -50\text{mA}, f = 100\text{MHz}$
Delay Time	t_d	—	16	—	ns	$V_{CC} = -10\text{V}, I_C = -1\text{A}$ $I_{B1} = -I_{B2} = -50\text{mA}$
Rise Time	t_r	—	11	—	ns	
Storage Time	t_s	—	220	—	ns	
Fall Time	t_f	—	31	—	ns	

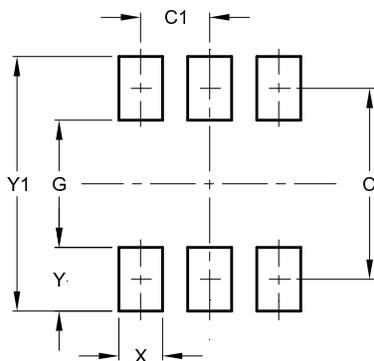
Note: 14. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$. Duty cycle $\leq 2\%$.

Package Outline Dimensions



SOT26			
Dim	Min	Max	Typ
A1	0.013	0.10	0.05
A2	1.00	1.30	1.10
A3	0.70	0.80	0.75
b	0.35	0.50	0.38
c	0.10	0.20	0.15
D	2.90	3.10	3.00
e	-	-	0.95
e1	-	-	1.90
E	2.70	3.00	2.80
E1	1.50	1.70	1.60
L	0.35	0.55	0.40
a	-	-	8°
a1	-	-	7°
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
C	2.40
C1	0.95
G	1.60
X	0.55
Y	0.80
Y1	3.20