

**CMLM0405**  
**MULTI DISCRETE MODULE™**  
SURFACE MOUNT  
LOW  $V_{CE}$  (SAT) SILICON NPN TRANSISTOR  
AND  
LOW  $V_F$  SILICON SCHOTTKY DIODE



# Central™

## Semiconductor Corp.

### DESCRIPTION:

The Central Semiconductor CMLM0405 is a single NPN Transistor and Schottky Diode packaged in a space saving SOT-563 case and designed for small signal general purpose applications where size and operational efficiency are prime requirements.

- Complementary Device: **CMLM0605**
- Combination Low  $V_{CE}$  (SAT) Transistor and Low  $V_F$  Schottky Diode.

### MARKING CODE: C45

#### MAXIMUM RATINGS (SOT-563 Package): ( $T_A=25^\circ\text{C}$ )

Power Dissipation  
Operating and Storage  
Junction Temperature  
Thermal Resistance

SYMBOL		UNITS
$P_D$	350	mW
$T_J, T_{stg}$	-65 to +150	$^\circ\text{C}$
$\theta_{JA}$	357	$^\circ\text{C/W}$

#### MAXIMUM RATINGS Q1: ( $T_A=25^\circ\text{C}$ )

Collector-Base Voltage  
Collector-Emitter Voltage  
Emitter-Base Voltage  
Collector Current

SYMBOL		UNITS
$V_{CBO}$	60	V
$V_{CEO}$	40	V
$V_{EBO}$	6.0	V
$I_C$	200	mA

#### MAXIMUM RATINGS D1: ( $T_A=25^\circ\text{C}$ )

Peak Repetitive Reverse Voltage  
Continuous Forward Current  
Peak Repetitive Forward Current,  $t_p \leq 1\text{ms}$   
Forward Surge Current,  $t_p=8\text{ms}$

SYMBOL		UNITS
$V_{RRM}$	40	V
$I_F$	500	mA
$I_{FRM}$	3.5	A
$I_{FSM}$	10	A

#### ELECTRICAL CHARACTERISTICS Q1: ( $T_A=25^\circ\text{C}$ unless otherwise noted)

SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
$I_{CEV}$	$V_{CE}=30\text{V}, V_{EB}=3.0\text{V}$	-	-	50	nA
$BV_{CBO}$	$I_C=10\mu\text{A}$	60	120	-	V
$BV_{CEO}$	$I_C=1.0\text{mA}$	40	60	-	V
$BV_{EBO}$	$I_E=10\mu\text{A}$	6.0	7.5	-	V
$V_{CE(SAT)}$	$I_C=10\text{mA}, I_B=1.0\text{mA}$		0.057	0.100	V
$V_{CE(SAT)}$	$I_C=50\text{mA}, I_B=5.0\text{mA}$		0.090	0.200	V
$V_{BE(SAT)}$	$I_C=10\text{mA}, I_B=1.0\text{mA}$	0.65	0.75	0.85	V
$V_{BE(SAT)}$	$I_C=50\text{mA}, I_B=5.0\text{mA}$		0.85	0.95	V
$h_{FE}$	$V_{CE}=1.0\text{V}, I_C=0.1\text{mA}$	90	180		
$h_{FE}$	$V_{CE}=1.0\text{V}, I_C=1.0\text{mA}$	100	185		
$h_{FE}$	$V_{CE}=1.0\text{V}, I_C=10\text{mA}$	100	180	300	
$h_{FE}$	$V_{CE}=1.0\text{V}, I_C=50\text{mA}$	70	150		
$h_{FE}$	$V_{CE}=1.0\text{V}, I_C=100\text{mA}$	30	90		
$f_T$	$V_{CE}=20\text{V}, I_C=10\text{mA}, f=100\text{MHz}$	300			MHz
$C_{ob}$	$V_{CB}=5.0\text{V}, I_E=0, f=1.0\text{MHz}$			4.0	pF
$C_{ib}$	$V_{BE}=0.5\text{V}, I_C=0, f=1.0\text{MHz}$			8.0	pF
$h_{ie}$	$V_{CE}=10\text{V}, I_C=1.0\text{mA}, f=1.0\text{kHz}$		1.0	12	$\text{k}\Omega$
$h_{re}$	$V_{CE}=10\text{V}, I_C=1.0\text{mA}, f=1.0\text{kHz}$		0.1	10	$\times 10^{-4}$

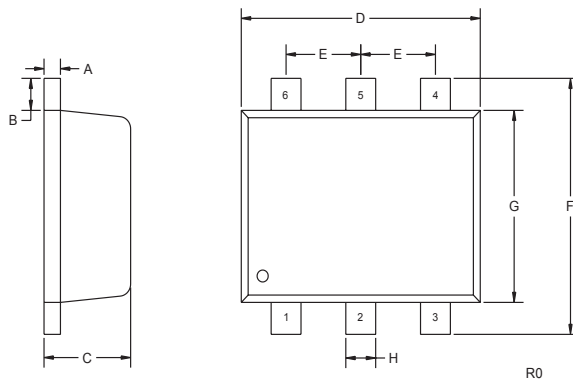
**ELECTRICAL CHARACTERISTICS Q1 (continued)**

SYMBOL	TEST CONDITIONS	MIN	MAX	UNITS
$h_{fe}$	$V_{CE}=10V, I_C=1.0mA, f=1.0kHz$	100	400	
$h_{oe}$	$V_{CE}=10V, I_C=1.0mA, f=1.0kHz$	1.0	60	$\mu mhos$
NF	$V_{CE}=5.0V, I_C=100\mu A, R_S=1.0K\Omega,$ $f=10Hz$ to $15.7kHz$		4.0	dB
$t_d$	$V_{CC}=3.0V, V_{BE}=0.5V, I_C=10mA, I_{B1}=1.0mA$		35	ns
$t_r$	$V_{CC}=3.0V, V_{BE}=0.5V, I_C=10mA, I_{B1}=1.0mA$		35	ns
$t_s$	$V_{CC}=3.0V, I_C=10mA, I_{B1}=I_{B2}=1.0mA$		200	ns
$t_f$	$V_{CC}=3.0V, I_C=10mA, I_{B1}=I_{B2}=1.0mA$		50	ns

**ELECTRICAL CHARACTERISTICS D1 ( $T_A=25^\circ C$ )**

$I_R$	$V_R=10V$		20	$\mu A$
$I_R$	$V_R=30V$		100	$\mu A$
$BV_R$	$I_R=500\mu A$	40		V
$V_F$	$I_F=100\mu A$		0.13	V
$V_F$	$I_F=1.0mA$		0.21	V
$V_F$	$I_F=10mA$		0.27	V
$V_F$	$I_F=100mA$		0.35	V
$V_F$	$I_F=500mA$		0.47	V
$C_T$	$V_R=1.0V, f=1.0MHz$		50	pF

**SOT-563 - MECHANICAL OUTLINE**



SYMBOL	DIMENSIONS			
	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.004	0.007	0.10	0.18
B	0.008		0.20	
C	0.022	0.024	0.56	0.60
D	0.059	0.067	1.50	1.70
E	0.020		0.50	
F	0.061	0.067	1.55	1.70
G	0.047		1.20	
H	0.006	0.012	0.15	0.30

SOT-563 (REV: R0)

**MARKING CODE: C45**

**LEAD CODE:**

- 1) EMITTER Q1
- 2) BASE Q1
- 3) CATHODE D1
- 4) ANODE D1
- 5) ANODE D1
- 6) COLLECTOR Q1

R1 (22-February 2005)