

**-25V -1.2A PNP Low VCEsat Transistor with N-channel Trench MOSFET**

**General Description**

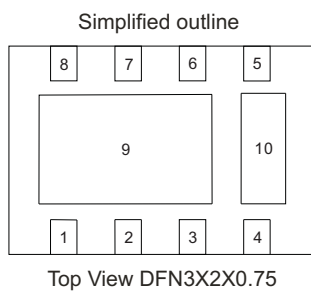
Combination of PNP low VCEsat Breakthrough In Small Signal transistor and N-channel Trench MOSFET. The device is housed in a leadless medium power DFN3X2 Surface-Mounted Device (SMD) plastic package.

**Applications**

- Loadswitch
- Power management
- Power switches (e.g.motors.fans)
- Charging circuits
- Battery-driven devices

**Features**

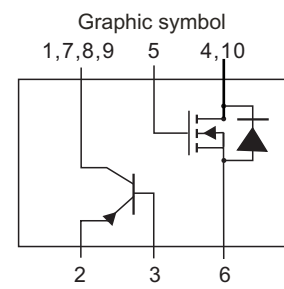
- Low collector-emitter saturation voltage  $V_{CEsat}$
- High collector current capability  $I_C$  and  $I_{CM}$
- High collector current gain ( $h_{FE}$ ) at high  $I_C$
- High energy efficiency due to less heat generation
- Smaller required Printed-Circuit Board(PCB) area than for conventional transistors



**Pin Description**

- 1 Collector
- 2 Emitter
- 3 Base
- 4 Drain
- 5 Gate
- 6 Source
- 7 Collector
- 8 Collector
- 9 Collector
- 10 Drain

Note:  
Pin#9, 10 is not GND.



**Absolute Maximum Ratings(TA=25°C,Unless Otherwise Noted)**

Parameter	Units	Value
Drain-Source Voltage (MOSFET)	20	V
Collector-Emitter breakdown voltage (PNP Transistor)	-25	
Gate-Source Voltage (MOSFET)	±12	
Collector-Base breakdown voltage(PNP Transistor)	-25	
Emitter-Base breakdown voltage(PNP Transistor)	-6	
Continuous Drain Current(MOSFET) <sup>a</sup>	300	mA
Pulsed Drain Current (MOSFET) <sup>b</sup>	800	
Diode Continuous Forward Current (MOSFET) <sup>a</sup>	1.7	
Collector Current(PNP Transistor)	-2	A
Total Dissipation (PNP Transistor)	2.5	W
Maximum Junction Temperature(PNP Transistor and MOSFET )	150	°C
Storage Temperature Range(PNP Transistor and MOSFET )	-55 to 150	
Soldering Recommendation (Peak Temperature)(PNP Transistor and MOSFET) <sup>c</sup>	260	
Thermal Resistance-Junction to Ambient At Steady State(MOSFET)	90	°C/W
Thermal Resistance-Junction to Ambient At Steady State(PNP Transistor)	50	

Notes:  
a.Surface Mounted on 1"x1" FR4 Board.  
b.Pulse test;pulse width≤300μs, duty cycle≤2%.  
c.Rework Conditions:manual soldering with a soldering iron is not recommended for leadless components.



**Packing Information**

Device	Marking	Tape Width	Reel Size	Quantity
MI5809		7"	8mm	3000 units

**MOSFET Static and Dynamic Characteristics(T<sub>A</sub> =25°C, Unless Otherwise Noted)**

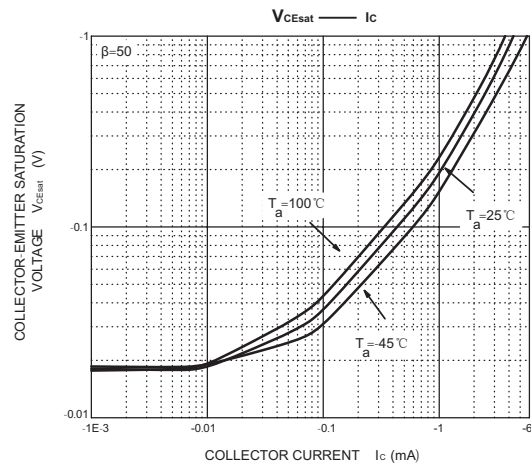
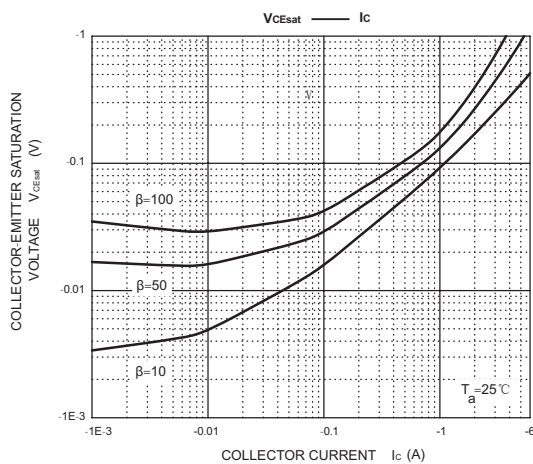
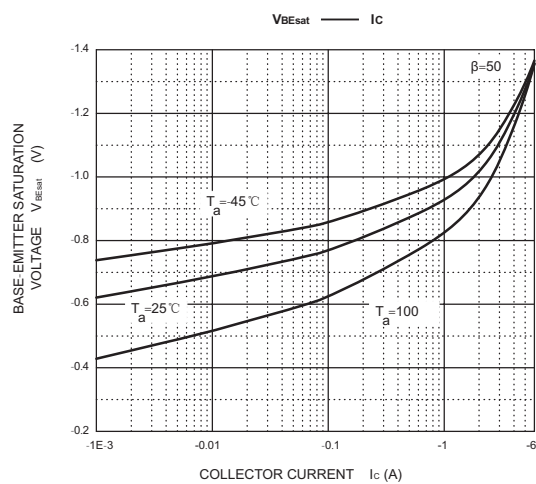
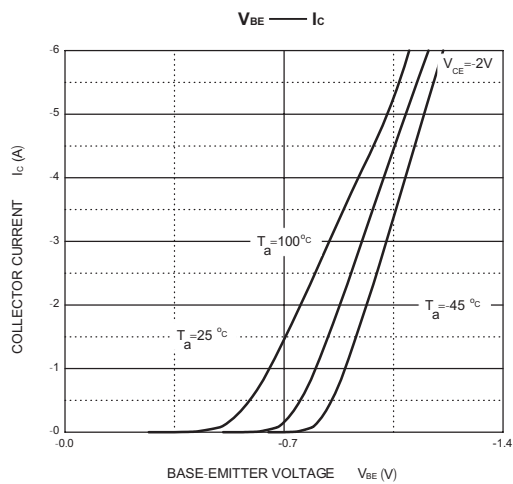
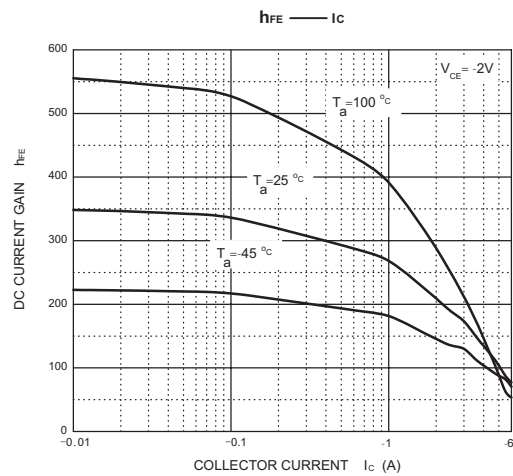
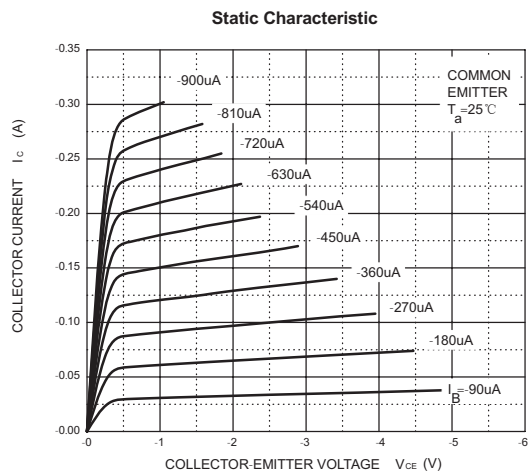
Parameter	Symbol	Test Condition	Min	Typ	Max	Units
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> =0V, I <sub>DS</sub> =250μA	20			V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =-250μA	0.5	0.7	1.0	V
Gate Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±12V			±10	μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =16V, V <sub>GS</sub> =0V T <sub>J</sub> =85°C			1 30	μA
Drain-Source On-State Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =4.5V, I <sub>DS</sub> =0.5A V <sub>GS</sub> =2.5V, I <sub>DS</sub> =0.5A		0.25 0.50		Ω
Diode Forward Voltage	V <sub>SD</sub>	I <sub>SD</sub> =0.5A, V <sub>GS</sub> =0V		0.7	1.3	V

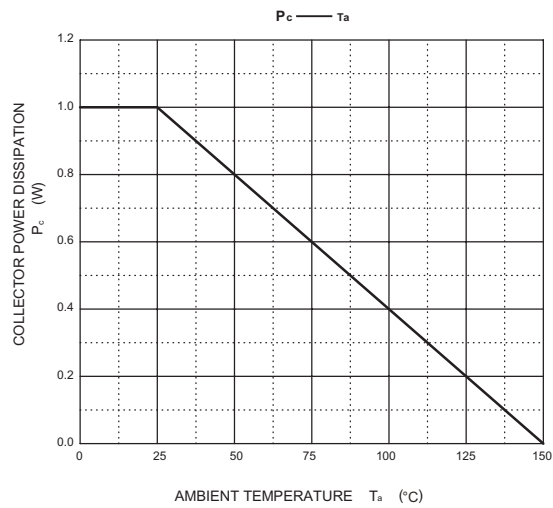
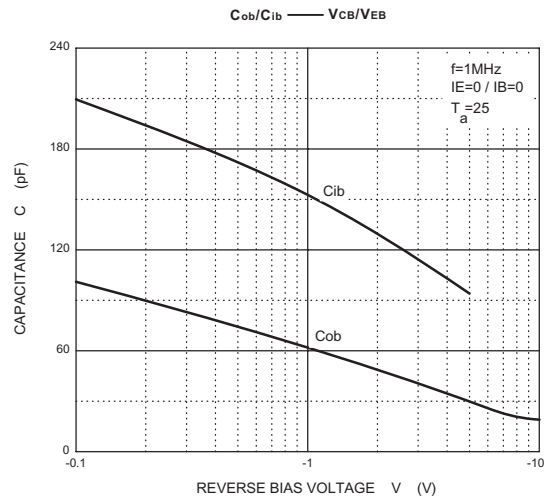
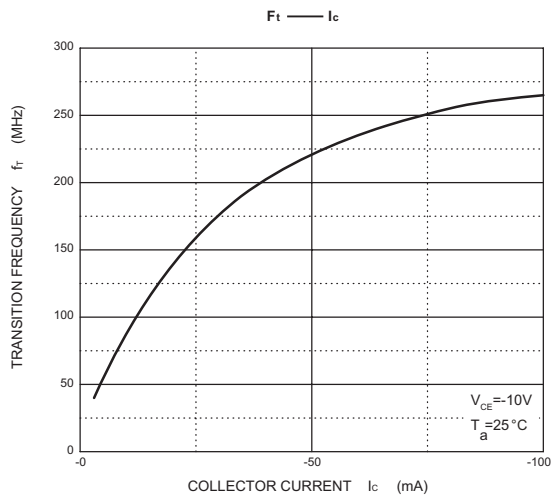
**PNP Transistor Specifications (TA=25°C Unless Otherwise Noted)**

Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Collector-base breakdown voltage	$V_{(BR)CBO}$	$I_C=-100\mu A, I_E=0$	-25			V
Collector-emitter breakdown voltage*	$V_{(BR)CEO}$	$I_C=-10mA, I_B=0$	-25			
Emitter-base breakdown voltage	$V_{(BR)EBO}$	$I_E=-100\mu A, I_C=0$	-6.0			
Collector cut-off current	$I_{CBO}$	$V_{CB}=-20V, I_C=0$			-0.1	uA
Emitter cut-off current	$I_{EBO}$	$V_{EB}=-6V, I_C=0$			-0.1	
DC current gain*	$h_{FE}$	$V_{CE}=-2V, I_C=-100mA$	300			
		$V_{CE}=-2V, I_C=-100mA$	300			
		$V_{CE}=-2V, I_C=-2A$	150			
		$V_{CE}=-2V, I_C=-6A$	15			
Collector-emitter saturation voltage*	$V_{CE(sat)}$	$I_C=-0.1A, I_B=-10mA$			-30	mV
		$I_C=-1A, I_B=-20mA$			-220	
		$I_C=-1.5A, I_B=-50mA$			-250	
		$I_C=-2.5A, I_B=-150mA$			-350	
		$I_C=-3.5A, I_B=-350mA$			-300	
Base-emitter turn-on voltage*	$V_{BE(on)}$	$V_{CE}=-2V, I_C=-3.5A$			-0.95	V
Base-emitter saturation voltage*	$V_{BE(sat)}$	$I_B=-350mA, I=-3.5V$			-1.075	
Transition frequency	$f_T$	$V_{CE}=-10V, I_C=-50mA$ $f=100MHz$	150			MHz
Turn-on time	$t_{on}$	$V_{CB}=-10V, I_C=-1A$ $I_{B1}=I_{B2}=-10mA$		40		ns
Turn-off time	$t_{off}$			670		

\* Pulse Test : Pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .

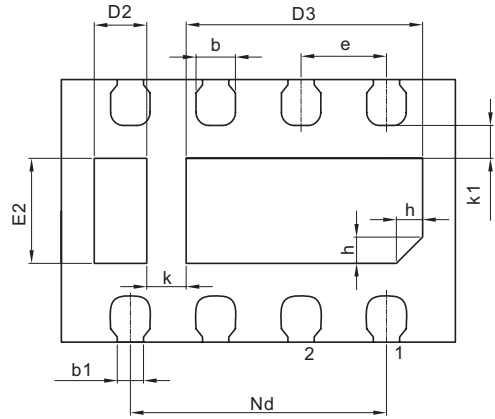
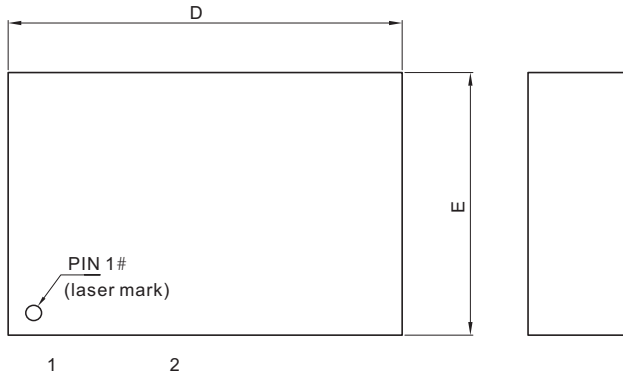
**Typical Electrical and Thermal Characteristics**  
**PNP Transistor Performance Curves ( $T_a=25^\circ\text{C}$ , unless otherwise noted)**



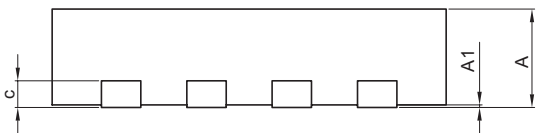


**Package Information**

DFN3X2X0.75



BOTTOM VIEW



SYMBOL	MILLIMETER		
	MIN.	NOM.	MAX.
A	0.70	0.75	0.80
A1		0.02	0.05
b	0.25	0.30	0.35
b1	0.15	0.20	0.25
c	0.15	0.20	0.25
D	2.90	3.00	3.10
D2	0.30	0.40	0.50
D3	1.70	1.80	1.90
e	0.65BSC		
Nd	1.95BSC		
E	1.90	2.00	2.10
E2	0.70	0.80	0.90
L	0.30	0.35	0.40
h	0.15	0.20	0.25
k	0.25	0.30	0.35
k1	0.20		