

**-25V -1A PNP Low VCEsat Transistor with N-channel Trench MOSFET**

**General Description**

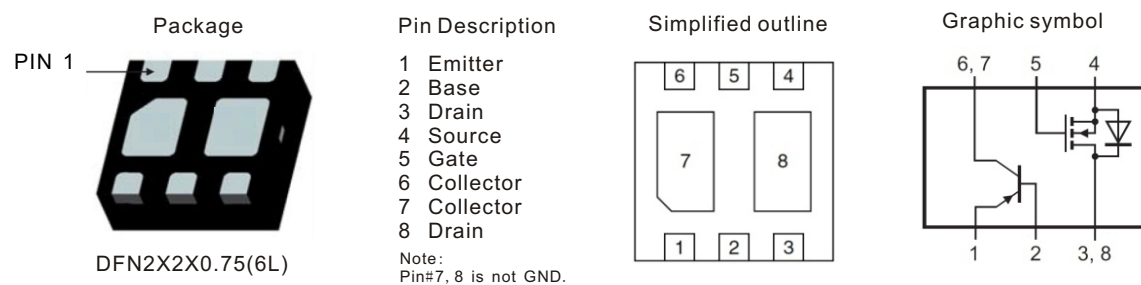
Combination of PNP low VCEsat Breakthrough In Small Signal transistor and N-channel Trench MOSFET. The device is housed in a leadless medium power DFN2X2 Surface-Mounted Device (SMD) plastic package.

**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



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

Parameter	Units	Value
Drain-Source Voltage (MOSFET)	30	V
Collector-Emitter breakdown voltage (PNP Transistor)	-25	
Gate-Source Voltage (MOSFET)	±12	
Collector-Base breakdown voltage(PNP Transistor)	-40	
Emitter-Base breakdown voltage(PNP Transistor)	-5	
Continuous Drain Current(MOSFET) <sup>a</sup>	2.5	A
Pulsed Drain Current (MOSFET) <sup>b</sup>	10	
Collector Current(PNP Transistor)	-1	
Diode Continuous Forward Current (MOSFET) <sup>a</sup>	1.7	W
Total Dissipation (PNP Transistor)	0.8	
Maximum Junction Temperature(PNP Transistor and MOSFET )	150	
Storage Temperature Range(PNP Transistor and MOSFET )	-55 to 150	°C
Soldering Recommendation (Peak Temperature)(PNP Transistor and MOSFET) <sup>c</sup>	260	
Thermal Resistance-Junction to Ambient At Steady State(MOSFET)	100	°C/W
Thermal Resistance-Junction to Ambient At Steady State(PNP Transistor)	110	

Notes:

- a. Surface Mounted on 1"x1" FR4 Board.
- b. Pulse test; pulse widths ≤ 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
MC2539	D439 ●xxxx	7"	8mm	3000 units

**MOSFET Static and Dynamic Characteristics(T<sub>J</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	30			V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =-250μA	0.6	0.75	1.0	
Gate Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±12V			±100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =24V, 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> =2.5A		80	100	mΩ
		V <sub>GS</sub> =2.5V, I <sub>DS</sub> =1.5A		90	120	
Diode Forward Voltage	V <sub>SD</sub>	I <sub>SD</sub> =1.7A, V <sub>GS</sub> =0V		0.7	1.3	V

**PNP Transistor Specifications (T<sub>J</sub>=25°C Unless Otherwise Noted)**

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
DC Current Gain(note)	H <sub>FE(1)</sub>	V <sub>CE</sub> =-1V, I <sub>C</sub> =-100mA	85		400	
	H <sub>FE(2)</sub>	V <sub>CE</sub> =-1V, I <sub>C</sub> =-800mA	40			
Transition Frequency	f <sub>T</sub>	V <sub>CE</sub> =-10V, I <sub>C</sub> =-50mA, f=30MHz	100			Mhz
Collector cut-off Current	I <sub>CBO</sub>	V <sub>CB</sub> =-40V, I <sub>E</sub> =0			-0.1	μA
Emitter cut-off Current	I <sub>CEO</sub>	V <sub>CE</sub> =-20V, I <sub>E</sub> =0			-0.1	
Emitter cut-off Current	I <sub>EBO</sub>	V <sub>EB</sub> =-5V, I <sub>C</sub> =0			-0.1	
Collector-bass breakdown voltage	V <sub>(BR)CBO</sub>	I <sub>C</sub> =-100μA, I <sub>E</sub> =0	-40			V
Emitter breakdown voltage	V <sub>(BR)CBO</sub>	I <sub>C</sub> =-0.1mA, I <sub>B</sub> =0	-25			V
Emitter-bass breakdown voltage	V <sub>(BR)CBO</sub>	I <sub>E</sub> =-100μA, I <sub>C</sub> =0	-5			V
Collector-emitter saturation voltage	V <sub>CE(sat)</sub>	I <sub>C</sub> =-800mA, I <sub>B</sub> =-80mA			-0.4	V
Collector-emitter saturation voltage	V <sub>CE(sat)</sub>	I <sub>C</sub> =-500mA, I <sub>B</sub> =-5mA			-0.6	V
Base-emitter saturation voltage	V <sub>BE(sat)</sub>	I <sub>C</sub> =-800mA, I <sub>B</sub> =-80mA			-1.2	V
Base-emitter voltage	V <sub>BE(on)</sub>	V <sub>CE</sub> =-1V, I <sub>C</sub> =-10mA			-1.0	V
Out capacitance	C <sub>ob</sub>	V <sub>CB</sub> =-10V, I <sub>E</sub> =0mA, f=1MHz			20	pF



### Typical Electrical and Thermal Characteristics

Typical MOSFET Performance Curves( $T_j=25^{\circ}\text{C}$ , unless otherwise noted)

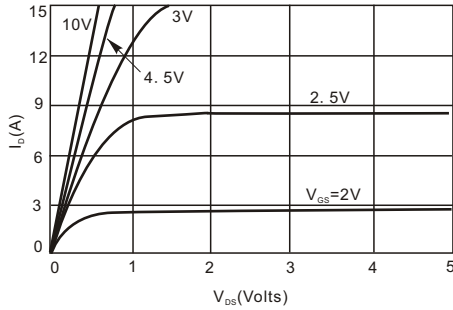


Figure1 On-Region Characteristics

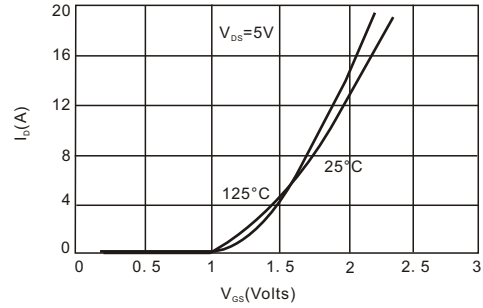


Figure2 Transfer Characteristics

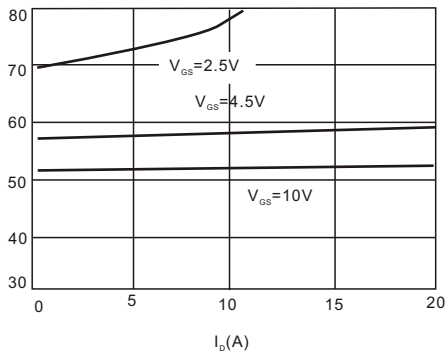


Figure3 On-Resistance vs Drain Current and Gate Voltage

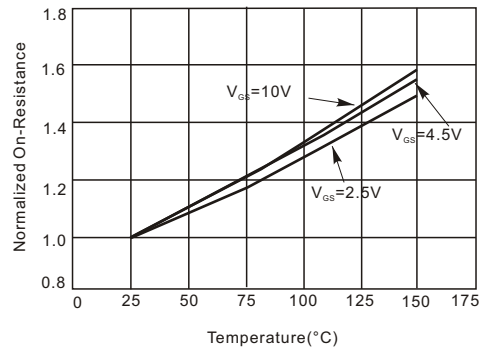


Figure4 On-Resistance vs Junction Temperature

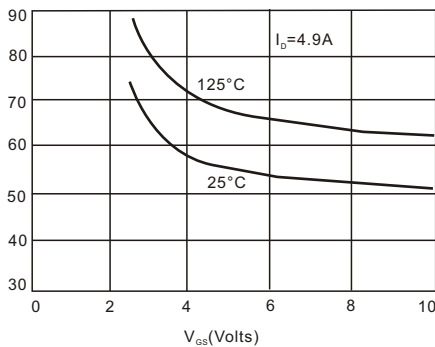


Figure5 On-Resistance vs Gate-Source Voltage

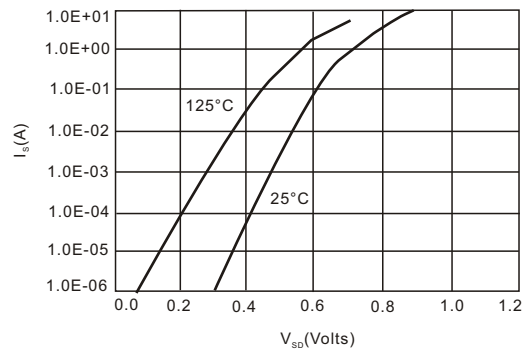
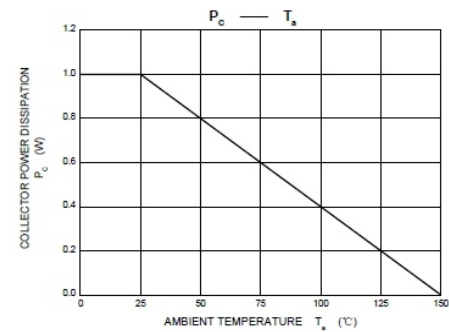
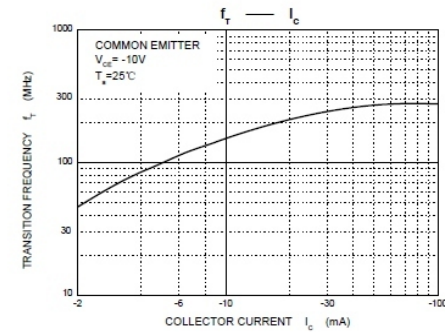
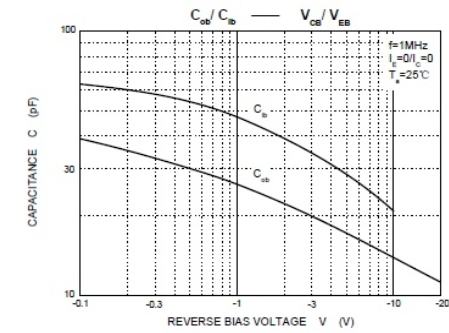
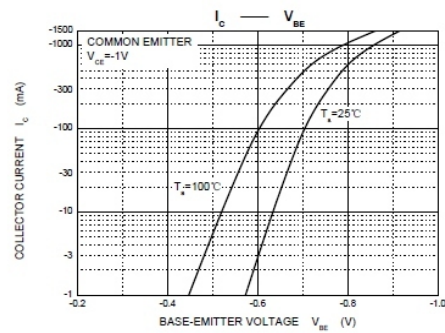
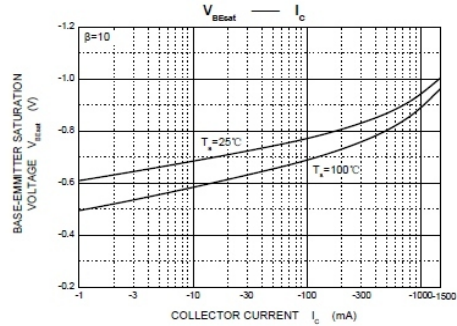
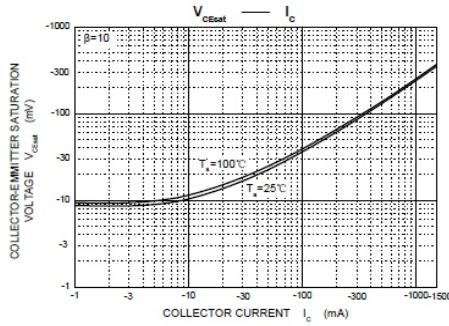
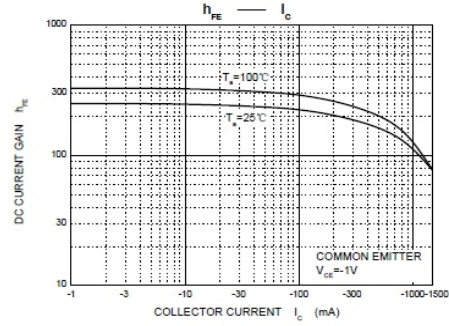
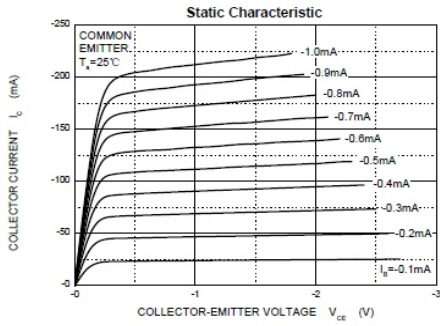


Figure6 Body-Diode Characteristics

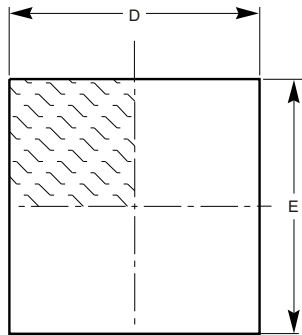
**Typical Electrical and Thermal Characteristics**

PNP Transistor Performance Curves ( $T_J=25^\circ\text{C}$ , unless otherwise noted)

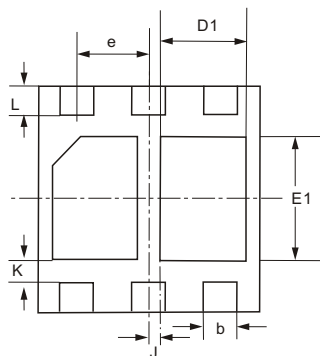


**Package Outline**

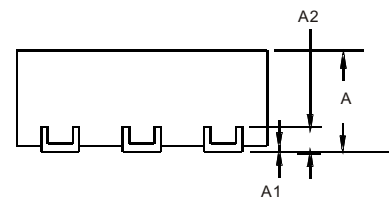
DFN2X2X0.75-6L



TOP VIEW



BOTTOM VIEW



SIDE VIEW

Unit:mm

Symbol	Min	Nom	Max
A	0.70	0.75	0.80
A1	0.00		0.05
A2	0.20REF		
b	0.25	0.30	0.35
D	2.00BSC		
D1	0.60	0.65	0.70
E	2.00BSC		
E1	0.80	0.85	0.90
e	0.65BSC		
K	0.25REF		
L	0.25	0.30	0.35
J	0.15REF		

Notes:

- (1) All dimensions are in millimeters. Angles in degree.
- (2) Package body size exclude mold flash and gate burrs.