

## COMPLIMENTARY PAIR ENHANCEMENT MODE MOSFETS

This space-efficient device contains an electrically-isolated complimentary pair of enhancement-mode MOSFETs (one N-channel and one P-channel). It comes in a very small SOT-363 (SC70-6L) package. This device is ideal for portable applications where board space is at a premium.

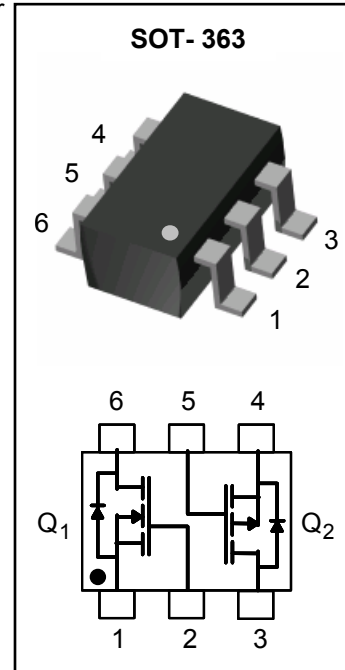
### FEATURES

- Complimentary Pairs
- Low On-Resistance
- Low Gate Threshold Voltage
- Fast Switching
- Lead free in comply with EU RoHS 2002/95/EC directives.
- Green molding compound as per IEC61249 Std. . (Halogen Free)

### APPLICATIONS

- Switching Power Supplies
- Hand-Held Computers, PDAs

**MARKING CODE: S82**



**MAXIMUM RATINGS - TOTAL DEVICE**  $T_J = 25^\circ\text{C}$  Unless otherwise noted

Rating	Symbol	Value	Units
Total Power Dissipation (Note 1)	$P_D$	200	mW
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

**MAXIMUM RATINGS N - CHANNEL -  $Q_1$ , 2N7002**  $T_J = 25^\circ\text{C}$  Unless otherwise noted

Rating	Symbol	Value	Units
Drain-Source Voltage	$V_{DSS}$	60	V
Drain-Gate Voltage $R_{GS} < 1.0\text{Mohm}$	$V_{DGR}$	60	V
Gate-Source Voltage - Continuous	$V_{GSS}$	$\pm 20$	V
Drain Current - Continuous (Note 1)	$I_D$	115	mA

**MAXIMUM RATINGS P - CHANNEL -  $Q_2$ , BSS84**  $T_J = 25^\circ\text{C}$  Unless otherwise noted

Rating	Symbol	Value	Units
Drain-Source Voltage	$V_{DSS}$	-50	V
Drain-Gate Voltage $R_{GS} < 20\text{Kohm}$	$V_{DGR}$	-50	V
Gate-Source Voltage - Continuous	$V_{GSS}$	$\pm 20$	V
Drain Current - Continuous (Note 1)	$I_D$	130	mA

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Value	Units
Thermal Resistance, Junction to Ambient (Note 1)	$R_{thja}$	625	$^\circ\text{C/W}$

Note 1. FR-5 board 1.0 x 0.75 x 0.062 inch with minimum recommended pad layout

**Electrical Characteristics - N-CHANNEL - Q<sub>1</sub> , 2N7002**  $T_J = 25^\circ\text{C}$  Unless otherwise noted

**OFF CHARACTERISTICS (Note 2)**

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	$BV_{DSS}$	$I_D = 10\mu\text{A}, V_{GS} = 0\text{V}$	60	80	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 60\text{V}, V_{GS} = 0$ $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$	-	-	1.0	$\mu\text{A}$
Gate-Body Leakage	$I_{GSS}$	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$	-	-	$\pm 10$	nA

**ON CHARACTERISTICS (Note 2)**

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	1.0	1.6	2.5	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 5\text{V}, I_D = 0.05\text{A}$ $V_{GS} = 10\text{V}, I_D = 0.5\text{A}$	-	1.8	4.5	Ohms
On-State Drain Current	$I_{D(on)}$	$V_{GS} = 10\text{V}, V_{DS} = 7.5\text{V}$	0.5	1.65	-	A
Forward Transconductance	$g_{FS}$	$V_{DS} = 10\text{V}, I_D = 0.2\text{A}$	0.08	-	-	S

**DYNAMIC CHARACTERISTICS**

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Input Capacitance	$C_{iss}$	$V_{DS} = 25\text{V},$ $V_{GS} = 0\text{V},$ $f = 1.0\text{MHz}$	-	-	50	pF
Output Capacitance	$C_{oss}$		-	-	25	pF
Reverse Transfer Capacitance	$C_{rss}$		-	-	5.0	pF

**SWITCHING CHARACTERISTICS**

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Turn-On Delay Time	$t_{D(on)}$	$V_{DD} = 30\text{V}, I_D = 0.2\text{A}, R_L = 150\text{ohm}$ $R_{GEN} = 25\text{ohm}, V_{GEN} = 10\text{V}$	-	-	20	ns
Turn-Off Delay Time	$t_{D(off)}$		-	-	20	ns

Note 2. Short duration test pulse used to minimize self-heating

**Electrical Characteristics - P-CHANNEL - Q<sub>2</sub>, BSS84**  $T_J = 25^\circ\text{C}$  Unless otherwise noted

**OFF CHARACTERISTICS (Note 3)**

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	$BV_{DSS}$	$I_D = -250\mu\text{A}, V_{GS} = 0\text{V}$	-50	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -50\text{V}, V_{GS} = 0\text{V}, T_J = 25^\circ\text{C}$	-	-	-15	$\mu\text{A}$
		$V_{DS} = -50\text{V}, V_{GS} = 0\text{V}, T_J = 125^\circ\text{C}$	-	-	-60	
		$V_{DS} = -25\text{V}, V_{GS} = 0\text{V}, T_J = 25^\circ\text{C}$	-	-	-0.1	
Gate-Body Leakage	$I_{GSS}$	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$	-	-	$\pm 10$	nA

**ON CHARACTERISTICS (Note 3)**

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -1\text{mA}$	-0.8	1.44	-2.0	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS} = -5\text{V}, I_D = -0.1\text{A}$	-	3.8	10	Ohms
Forward Transconductance	$g_{FS}$	$V_{DS} = -25\text{V}, I_D = -0.1\text{A}$	0.05	-	-	S

**DYNAMIC CHARACTERISTICS**

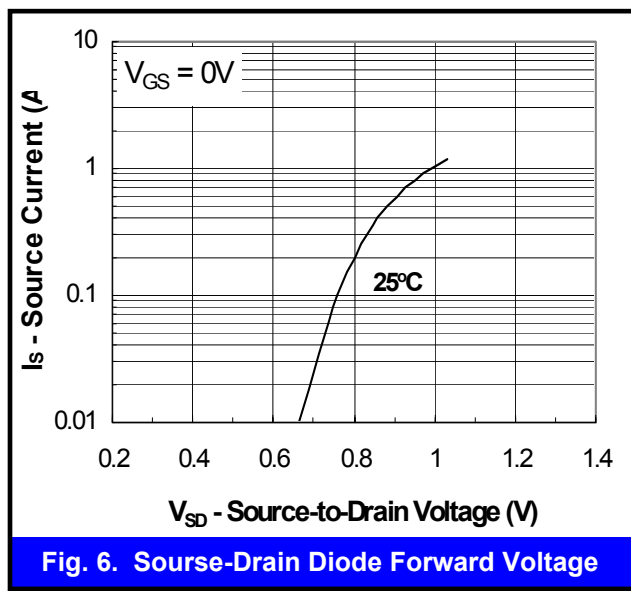
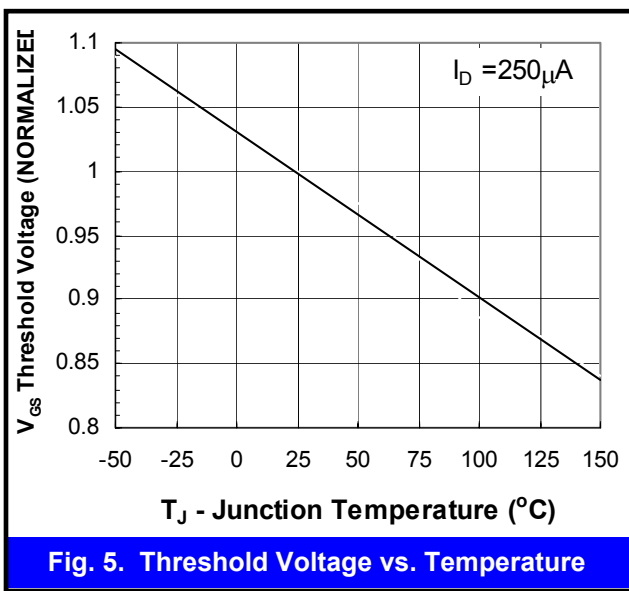
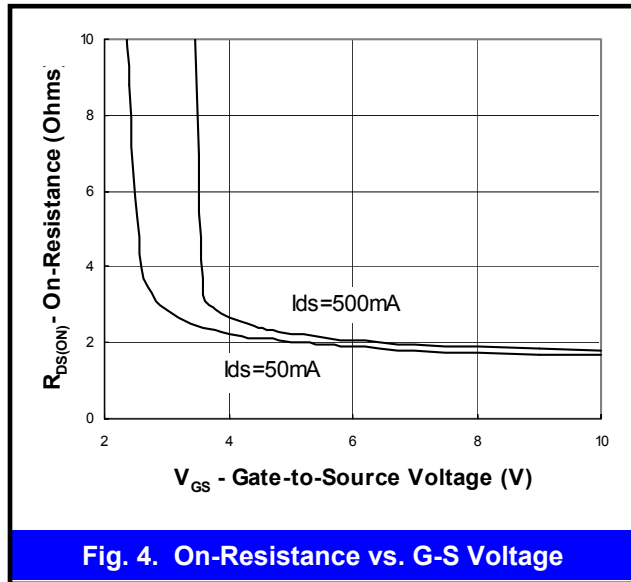
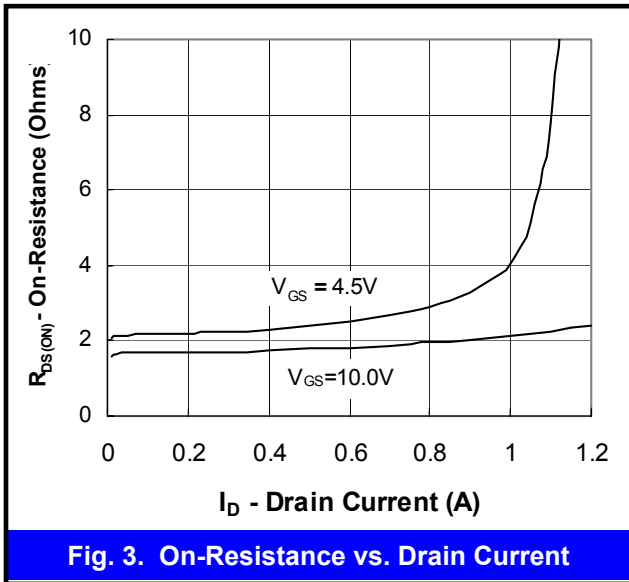
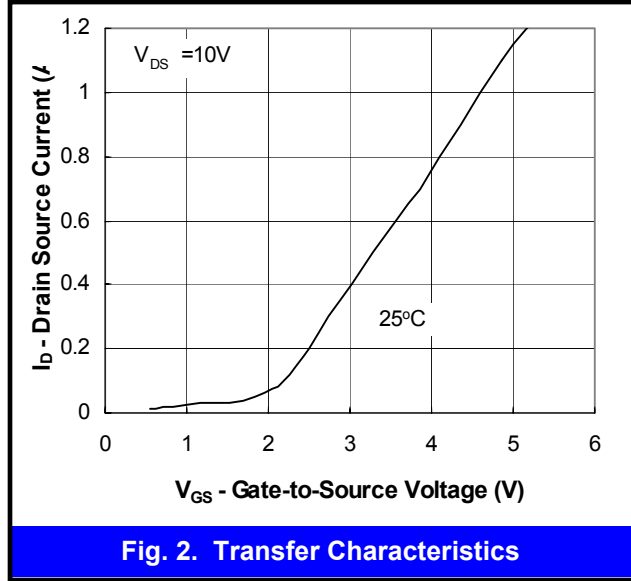
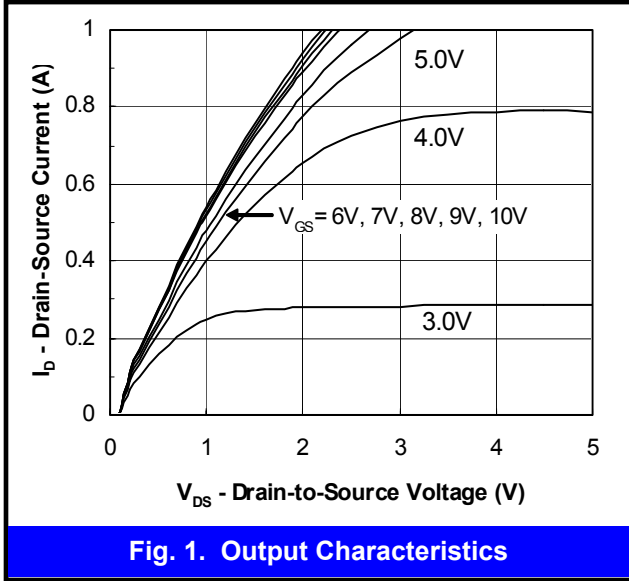
Parameter	Symbol	Conditions	Min	Typ	Max	Units
Input Capacitance	$C_{iss}$	$V_{DS} = -25\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$	-	-	45	pF
Output Capacitance	$C_{oss}$		-	-	25	pF
Reverse Transfer Capacitance	$C_{rss}$		-	-	12	pF

**SWITCHING CHARACTERISTICS**

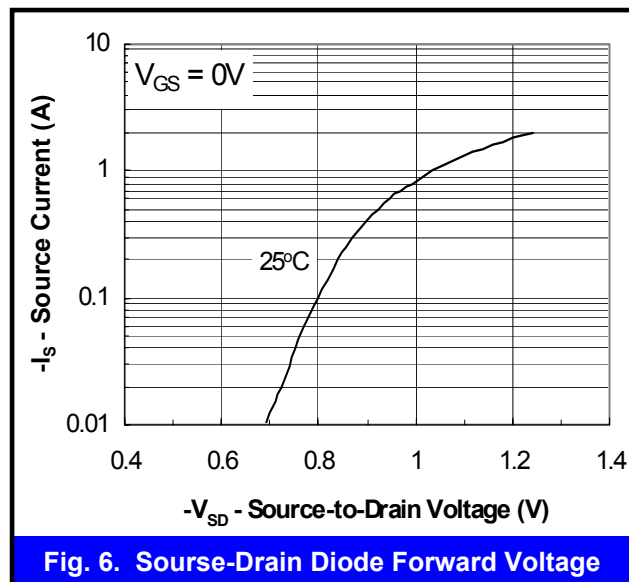
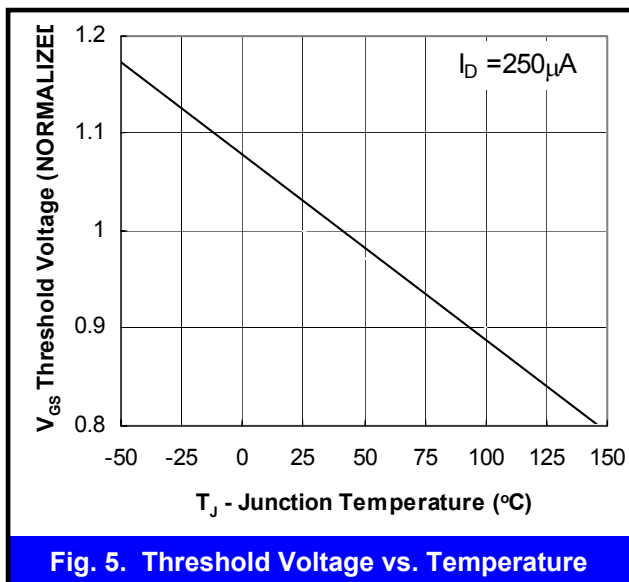
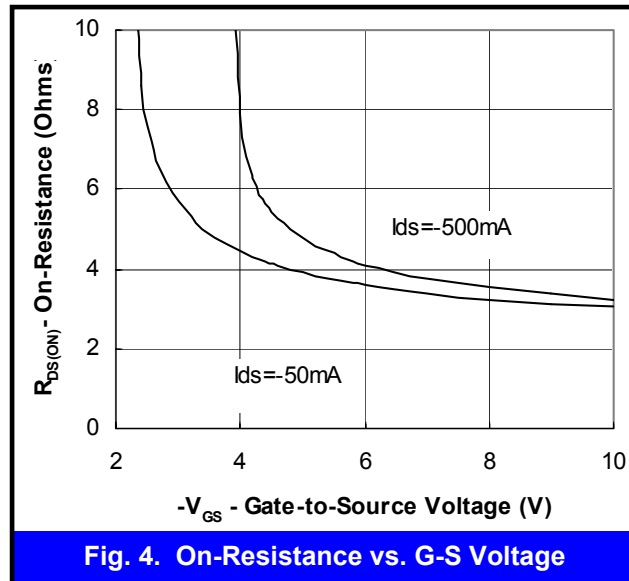
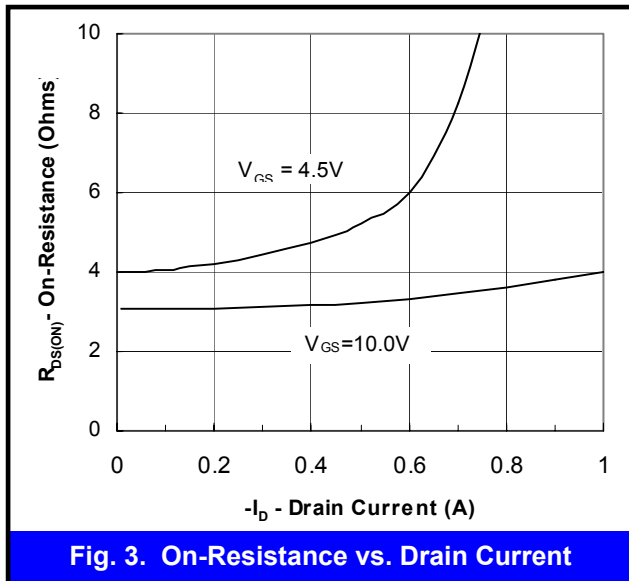
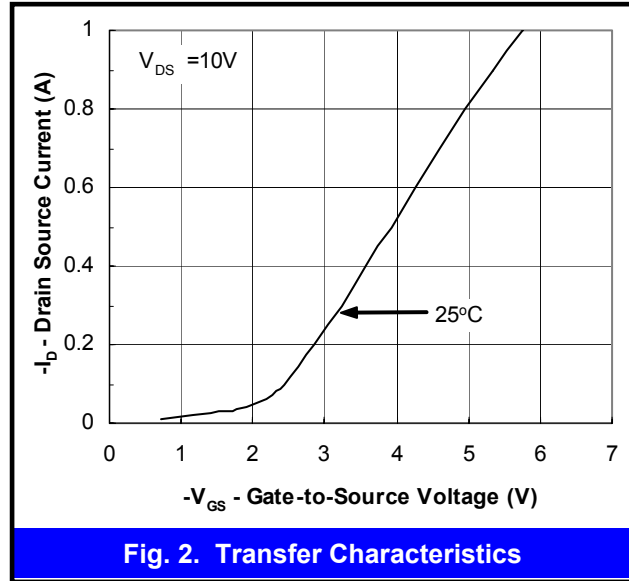
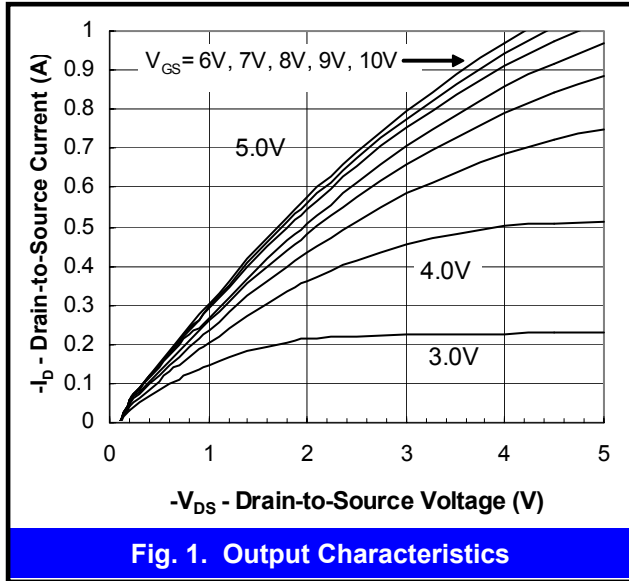
Parameter	Symbol	Conditions	Min	Typ	Max	Units
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD} = -30\text{V}, I_D = -0.27\text{A}, R_{GEN} = 50\text{ohm}, V_{GS} = -10\text{V}$	-	7.5	-	ns
Turn-Off Delay Time	$t_{D(OFF)}$		-	25	-	ns

Note 3. Short duration test pulse used to minimize self-heating

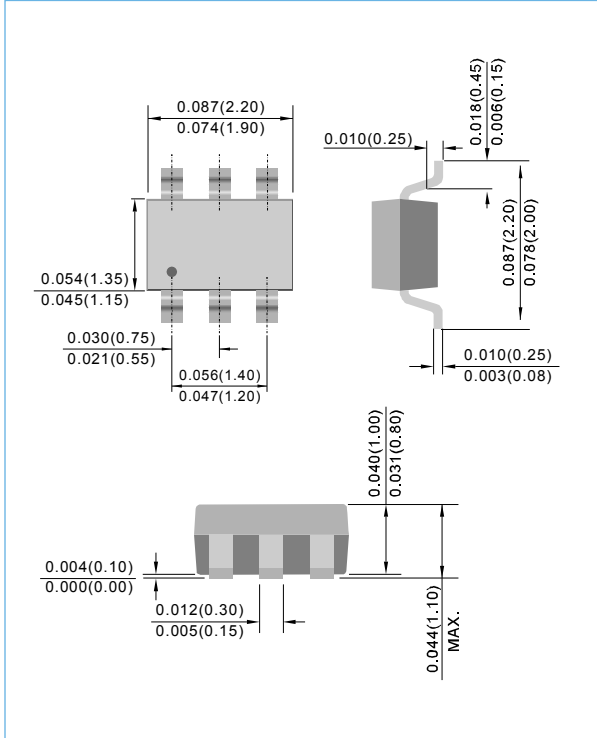
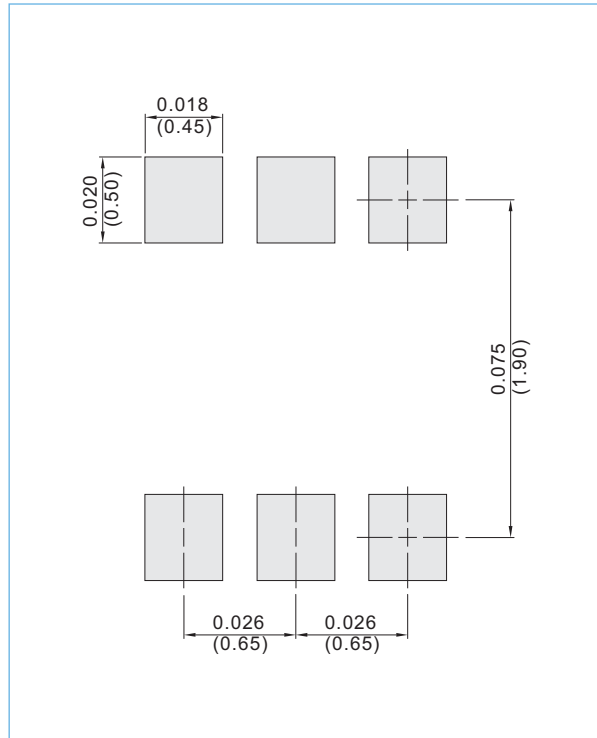
**Typical Characteristics Curves - N-Channel - Q<sub>1</sub>, 2N7002** T<sub>J</sub> = 25°C Unless otherwise noted



**Electrical Characteristic Curves - P-Channel - Q<sub>2</sub>, BSS84** T<sub>J</sub> = 25°C Unless otherwise noted



## PACKAGE LAYOUT AND SUGGESTED PAD DIMENSIONS

**SOT-363** Unit : inch(mm)

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## ORDERING INFORMATION

BSS8402DW T/R7: 7 inch reel, 3K units per reel, Pin 1 towards tape sprocket holes

BSS8402DW T/R7-R: 7 inch reel, 3K units per reel, Pin 1 away from tape sprocket holes

BSS8402DW T/R13: 13 inch reel, 10K units per reel, Pin 1 towards tape sprocket holes

BSS8402DW T/R13-R: 13 inch reel, 10K units per reel, Pin 1 away from tape sprocket holes



# BSS8402DW

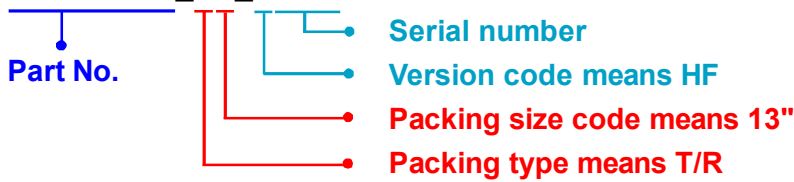
## Part No\_packing code\_Version

BSS8402DW\_R1\_00001

BSS8402DW\_R2\_00001

For example :

**RB500V-40\_R2\_00001**



Packing Code <b>XX</b>				Version Code <b>XXXXX</b>		
Packing type	1 <sup>st</sup> Code	Packing size code	2 <sup>nd</sup> Code	HF or RoHS	1 <sup>st</sup> Code	2 <sup>nd</sup> ~5 <sup>th</sup> Code
Tape and Ammunition Box (T/B)	A	N/A	0	HF	0	serial number
Tape and Reel (T/R)	R	7"	1	RoHS	1	serial number
Bulk Packing (B/P)	B	13"	2			
Tube Packing (T/P)	T	26mm	X			
Tape and Reel (Right Oriented) (TRR)	S	52mm	Y			
Tape and Reel (Left Oriented) (TRL)	L	PANASERT T/B CATHODE UP (PBCU)	U			
FORMING	F	PANASERT T/B CATHODE DOWN (PBCD)	D			



## BSS8402DW

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