

/ Descriptions

TO-220 P MOS P-CHANNEL MOSFET in a TO-220 Plastic Package.

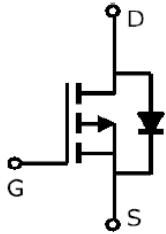
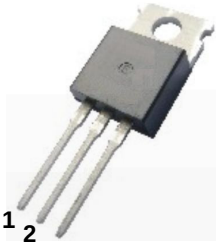
/ Features

Low gate charge, low c_{rss} , fast switching.

/ Applications

DC/DC

These devices are well suited for high efficiency switching DC/DC converters and switch mode power supplies.

/ Equivalent Circuit**/ Pinning**

PIN1 G

PIN 2 D

PIN 3 S

/ h_{FE} Classifications & Marking

See Marking Instructions.

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	-30	V
Drain Current	I_D	-90	A
Drain Current - Pulsed	I_{DM}	-360	A
Gate-Source Voltage	V_{GS}	± 20	V
Single Pulsed Avalanche Energy	E_{AS}	370	mJ
Avalanche current, single pulse	I_{AS}	-37	A
Power Dissipation	$P_{tot}(T_c=25^\circ C)$	137	W
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V$ $I_D=-1mA$	-30			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-30V$ $V_{GS}=0V$ $T_a=25^\circ C$			-1.0	μA
		$V_{DS}=-30V$ $V_{GS}=0V$ $T_a=125^\circ C$			-200	μA
Gate-Body Leakage Current, Forward	I_{GSS}	$V_{GS}=\pm 20V$ $V_{DS}=0V$			± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$ $I_D=-250\mu A$	-1.2		-2.2	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=-10V$ $I_D=-20A$		4.4	6	m Ω
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS}=0V$ $I_F=-24A$			-1.2	V
Input Capacitance	C_{iss}	$V_{DS}=-25V$ $V_{GS}=0V$ $f=1.0MHz$		6600		pF
Output Capacitance	C_{oss}			675		
Reverse Transfer Capacitance	C_{rss}			518		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=-15V$ $I_D=-90A$ $V_{GS}=-10V$ $R_{GEN}=3.5\Omega$		35		ns
Turn-On Rise Time	t_r			10		
Turn-Off Delay Time	$t_{d(off)}$			70		
Turn-Off Fall Time	t_f			20		

/ Electrical Characteristics(Ta=25 °C)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Gate to source charge	Q_{gs}	$V_{DD}=-24V, I_D=-90A,$ $V_{GS}=0 \text{ to } -10V$		42	55	nC
Gate to drain charge	Q_{gd}			10	20	nC
Gate charge total	Q_g			100	130	nC
Gate plateau voltage	$V_{plateau}$			-5.3		V
Diode continuous forward current ²⁾	I_S	$T_C=25^\circ C$			-90	A
Diode pulse current ²⁾	$I_{S,pulse}$				-360	A
Reverse recovery time ²⁾	t_{rr}	$V_R=-15V, I_F=-50A,$ $di_F/dt = -100A/\mu s$		50		nS
Reverse recovery charge ²⁾	Q_{rr}			70		nC
Thermal resistance, junction - case	$R_{\theta JA}$				1.1	K/W
SMD version, device on PCB	$R_{\theta JC}$	minimal footprint			62	
		6 cm ² cooling area ³⁾			40	

1) Current is limited by bondwire; with an $R_{\theta JC} = 1.1K/W$ the chip is able to carry -143A at 25°C.

2) Defined by design. Not subject to production test.

3) Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm² (one layer, 70 μm thick) copper area for drain connection. PCB is vertical in still air.

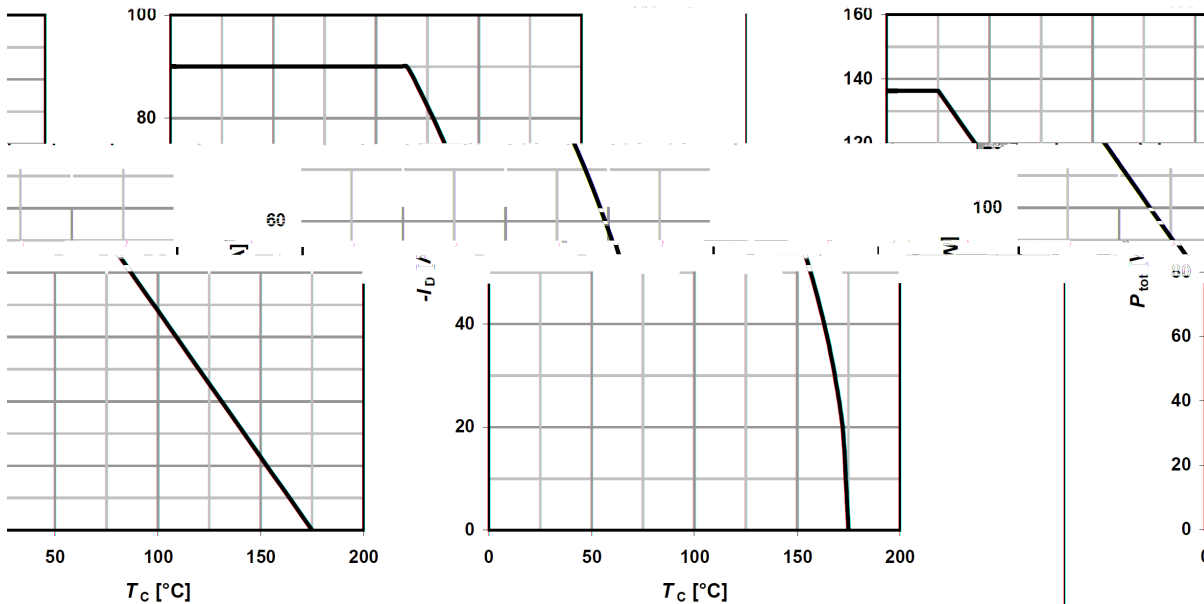


Electrical Characteristic Curve

1 Power dissipation

 $V_{GS} \leq -6V$

2 Drain current

 $P_{tot} = f(T_C); V_{GS} \leq -6V$
 $I_D = f(T_C)$


ng area

 $= 25^\circ C; D = 0$

4 Max. transient thermal impedance

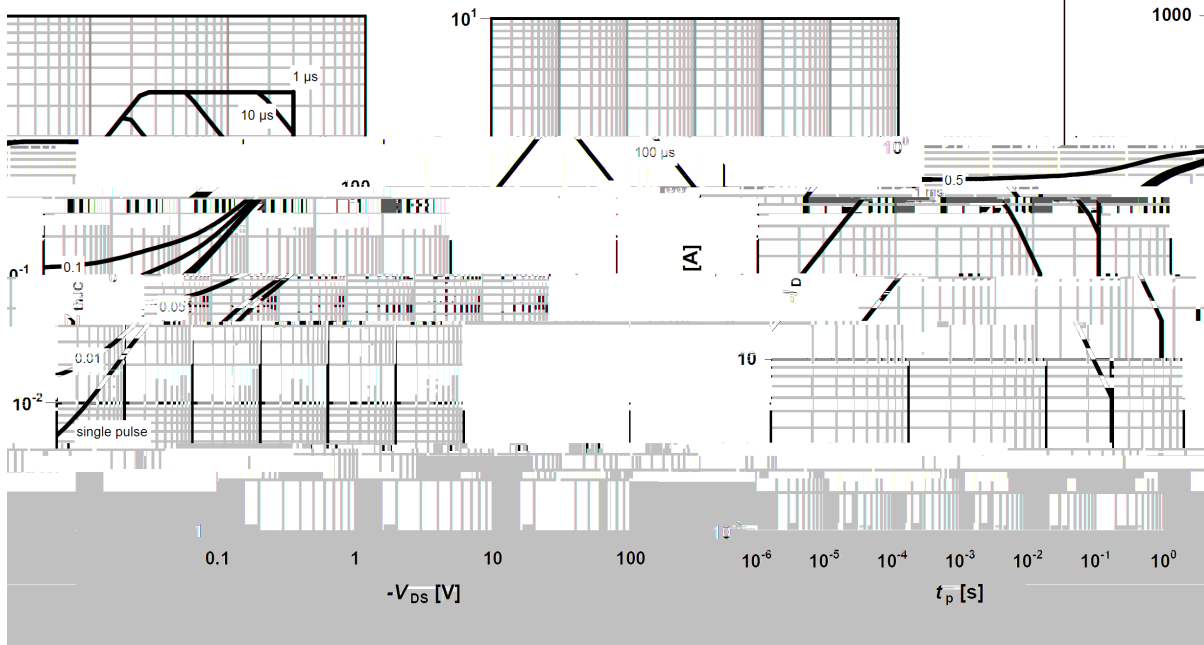
 $Z_{thJC} = f(t_p)$

 parameter: $D = t_p / T$

3 Safe op

 $I_D = f(V_{DS})$

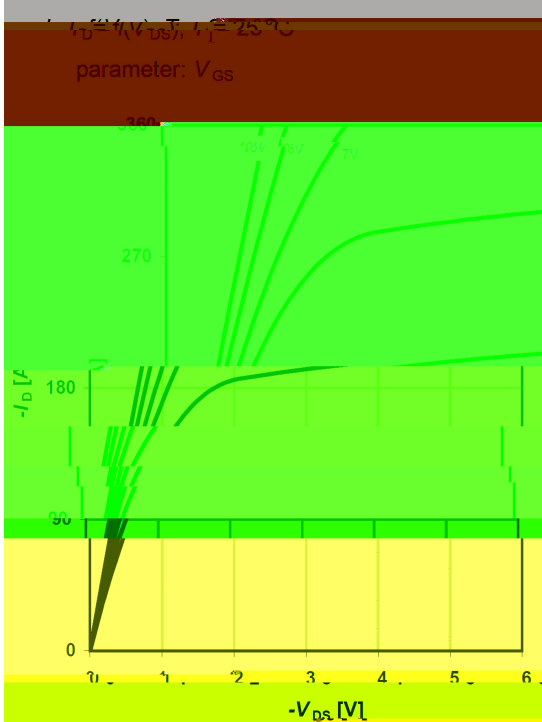
parameter



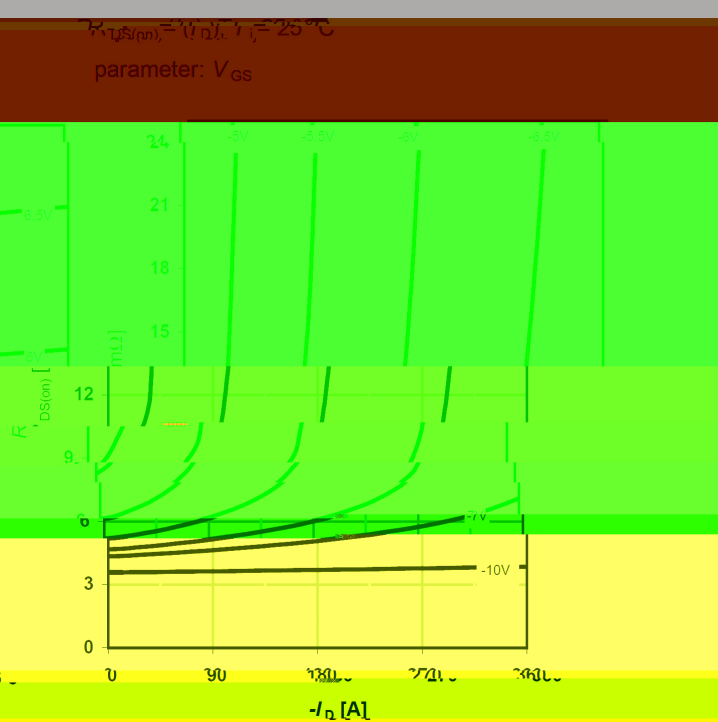


/ Electrical Characteristic Curve

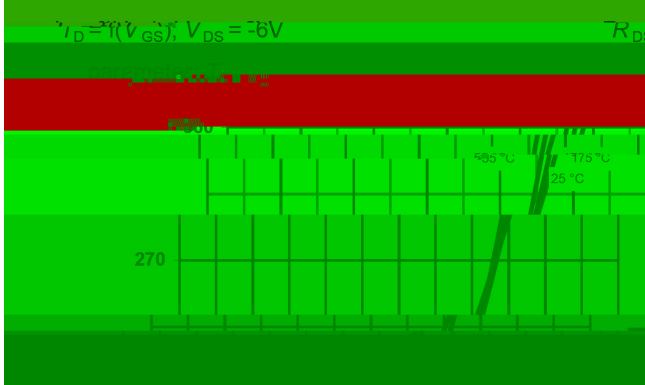
5 Typ. output characteristics



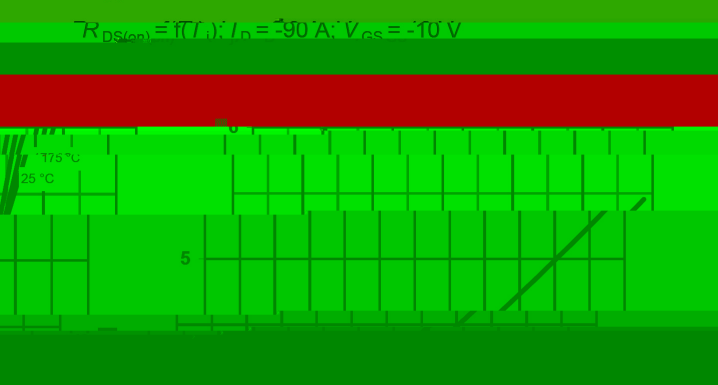
6 Typ. drain-source on-state resistance



7 Typ. transfer characteristics

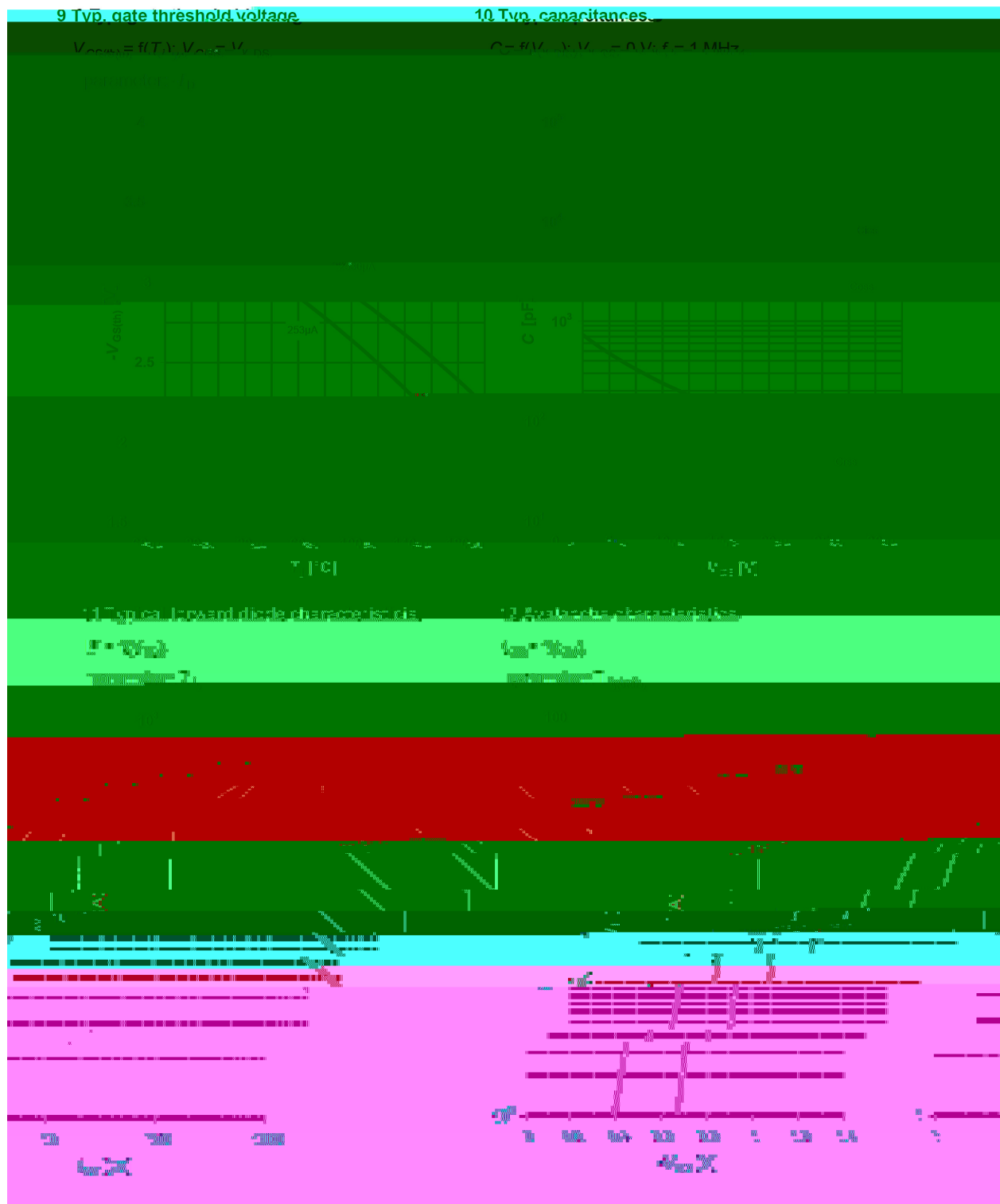


8 Typ. drain-source on-state resistance

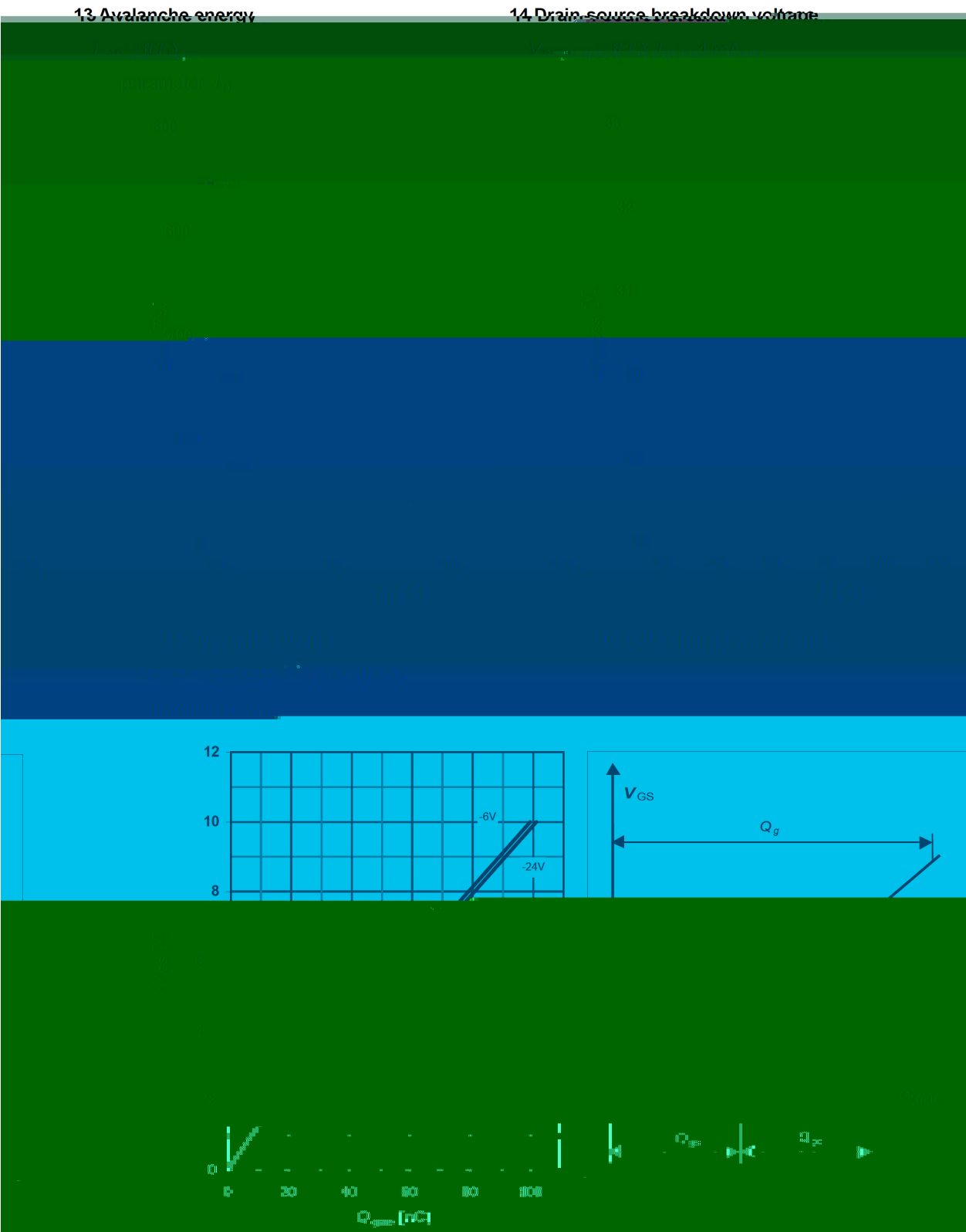




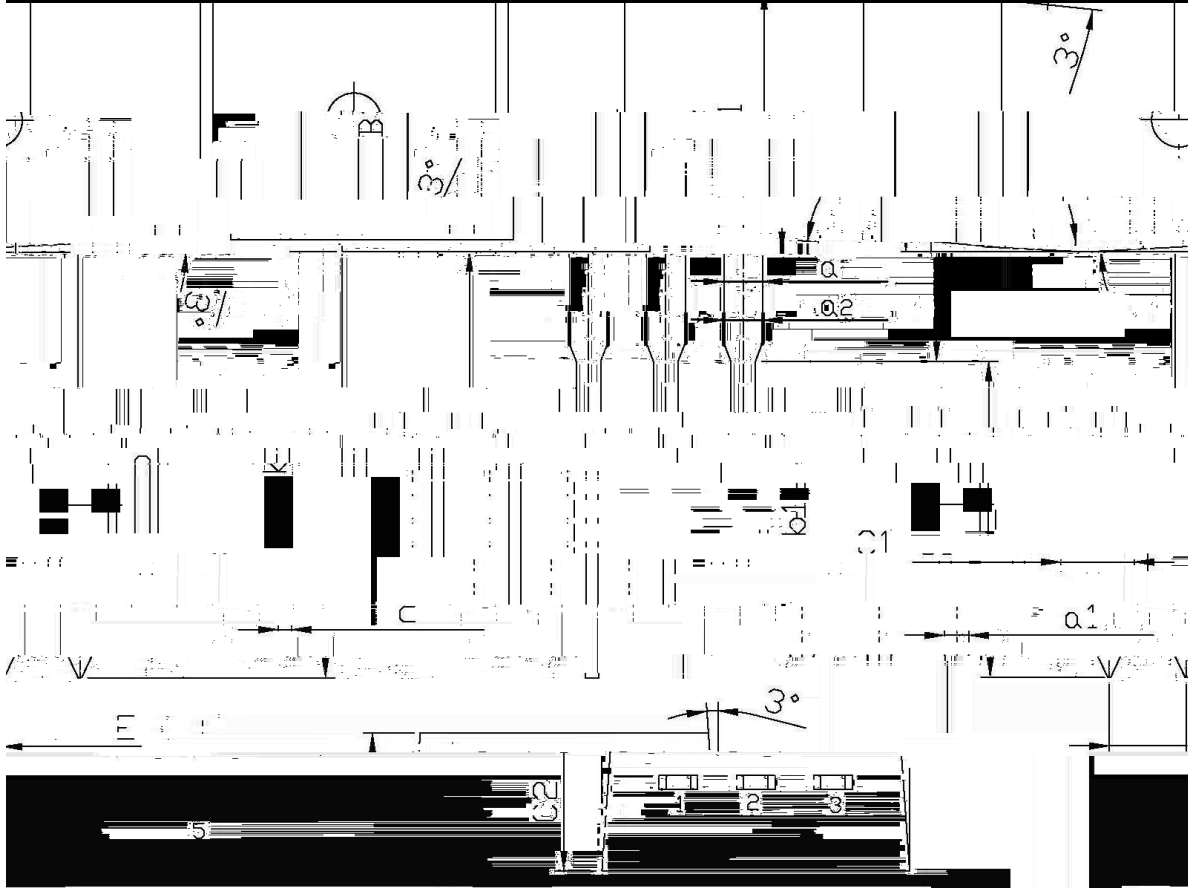
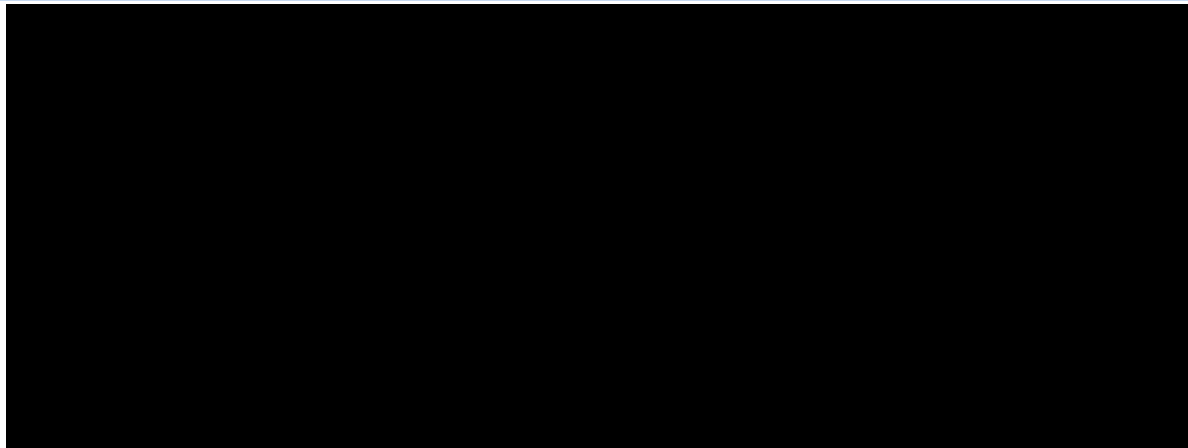
/ Electrical Characteristic Curve



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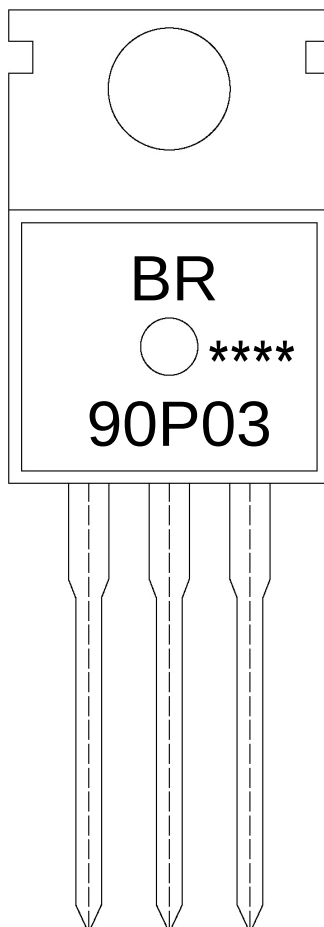


/ Package Dimensions



Dimensions in Millimeters				Dimensions in Millimeters			
Symbol	Min	Max	Symbol	Min	Max	Symbol	Min
	14	9.8		10.2	14.2		16.1
	6.7	5.36		5.36	8.64		16.8
	9.4	15.74		15.74	16.1		9
	2.6	12.6		12.6	13.6		10.1
	10.9	9.6		9.6	10.6		10
	10.6	10.4		10.4	10.4		10.4
	12.74	10.2		10.2	12.34		12.34
	1.45	0.2		0.2	1.25		1.25

/ Marking Instructions



BR

90P03

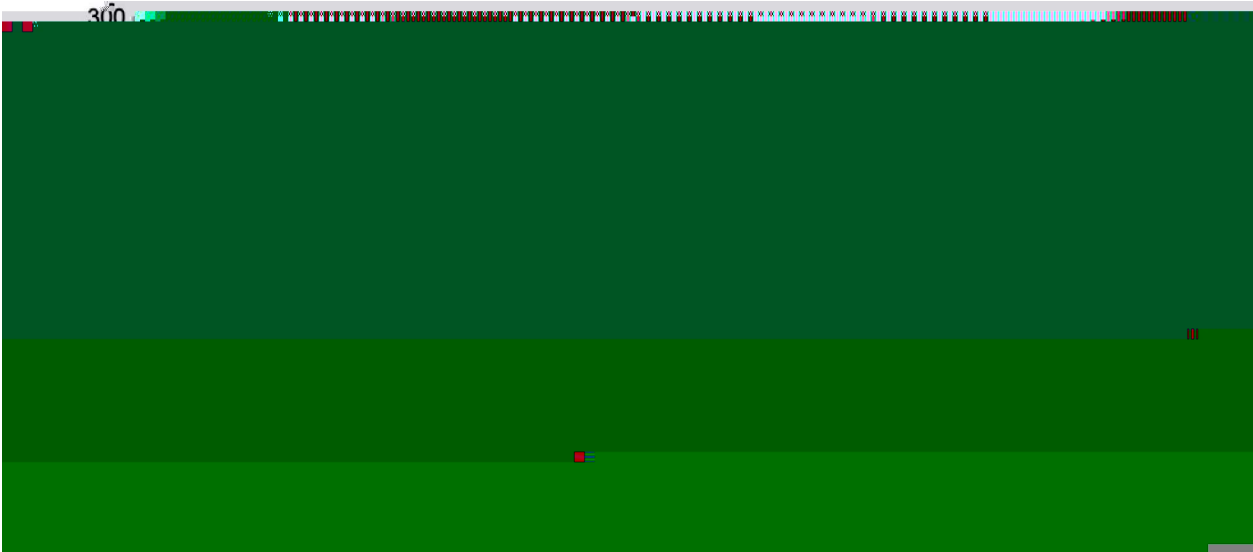
Note:

BR: Company Code

90P03: Product Type.

****: Lot No. Code, code change with Lot No.

() / Temperature Profile for Dip Soldering(Pb-Free)



- 1

25 150

60 90sec;
- 2

255±5

5±0.5sec;
- 3

2 10

/sec.
- Note:
1.Preheating:25~150 , Time:60~90sec.
2.Peak Temp.:255±5 , Duration:5±0.5sec.
3. Cooling Speed: 2~10 /sec.

/ Resistance to Soldering Heat Test Conditions

270±5 10±1 sec. Temp.:270±5 Time:10±1 sec

/ Packaging SPEC.

/ BULK

Package Type
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