BTT04PL041SR1

P-Channel Power MOSFET

-40 V, -175 A, 4.15 mΩ

Description

This P-Channel MOSFET has been designed specifically to improve the overall efficiency. It has been optimized for low gate charge, low R_{DSon}, fast switching speed.

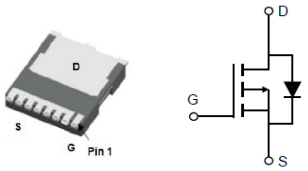
Features

BV_{DSS}	I_D	$R_{DS(on),max}$	$Q_{rr.typ}$
-40 V	-175 A	4.15 mΩ	110 nC

- RDSON_MAX=4.15mΩ@Vgs=10V
- Low gate Charge
- Low On-Resistance
- Advanced Trench Technology
- 100% UIS and Rg tested

Applications

- Load Switch
- PWM Application
- Power Management



Absolute Maximum Ratings (T_J = 25℃ unless otherwise noted)

Symbol	Parameter		Value	Unit
V_{DS}	Drain to Source Voltage		-40	V
V_{GS}	Gate to Source Voltage		±20	V
I_D	Continuous Drain Current (TC = 25 °C)		-175	A
	Continuous Drain Current (TC = 100 °C)		-111	
I_{DM}	Drain Current (1)	Pulsed	-700	A
E_{AS}	Single Pulsed Avalanche Energy (2)		3.38	J
P_D	Power Dissipation	(T_C = 25℃)	145	W
T_J , T_{STG}	Operating and Storage Temperature Range		-55 to 150	℃

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.86	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	8.87	
T_L	Soldering temperature, wave soldering only allowed at leads	260	℃

Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
2. EAs condition: Starting Tj=25°C, VD=-100V, VG=-10V, L=10mH, IAS=-26A

Electrical Characteristics (T_J = 25℃ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	V_{GS} = 0 V, I_D = -250uA	-40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -40 V, V_{GS} = 0 V	-	-	-1	μA
I_{GSS}	Gate-Source Leakage Current	V_{GS} = ±20 V, V_{DS} = 0 V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS} , I_D = -250 μA	-1	-1.7	-2.4	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = -10 V, I_D = -20A	-	3.2	4.15	mΩ
R_G	Gate resistance	f = 1 MHz open drain	-	15	-	Ω
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS} = 0 V, V_{DS} = -20 V f = 1 MHz	-	4768	-	pF
C_{oss}	Output Capacitance		-	848	-	pF
C_{rss}	Reverse Transfer Capacitance		-	465	-	pF
$Q_{g(tot)}$	Gate Charge Total	V_{GS} = 0 to -10V V_{DS} = -20V, I_D = -20A	-	156	-	nC
Q_{gs}	Gate to Source Charge		-	30.1	-	nC
Q_{gd}	Gate to Drain Charge		-	14.9	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{GS} = -10V, V_{DD} = -20V I_D = -20A, R_G = 3Ω	-	9.4	-	ns
t_r	Turn-On Rise Time		-	10.4	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	564	-	ns
t_f	Turn-Off Fall Time		-	297	-	ns
Source-Drain Diode Characteristics						
V_{SD}	Diode Forward Voltage	V_{GS} = 0 V, I_F = -20A	-	-	-1.2	V
t_{rr}	Reverse Recovery Time	I_F = -20 A, di_F/dt = 100 A/μs	-	268	-	ns
Q_{rr}	Reverse Recovery Charge		-	760	-	nC

Typical Performance Characteristics

Figure 1. Transient Thermal Impedance

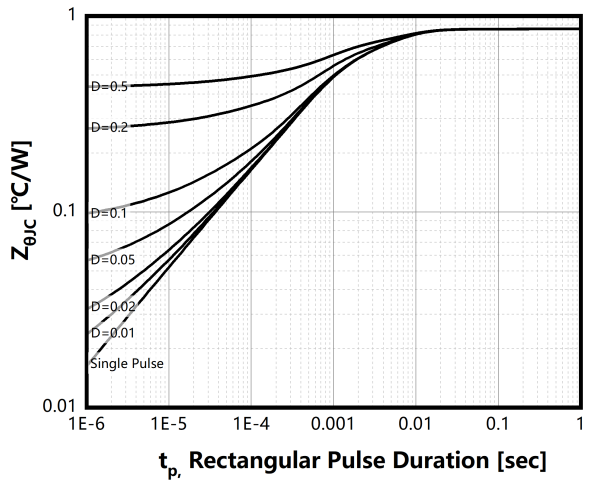


Figure 2 . Safe Operation Area

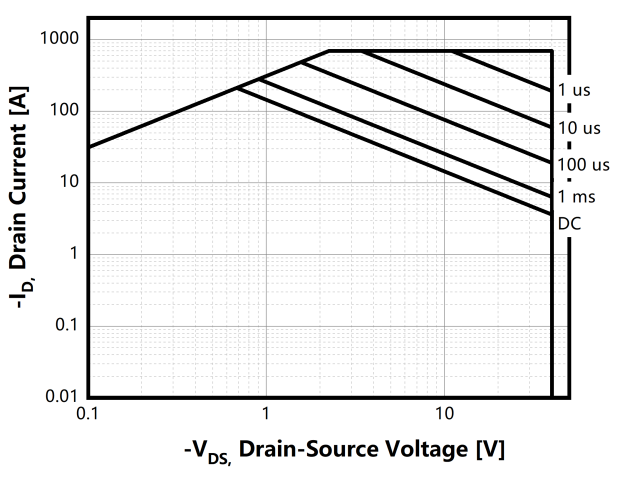


Figure 3 . Output Characteristics

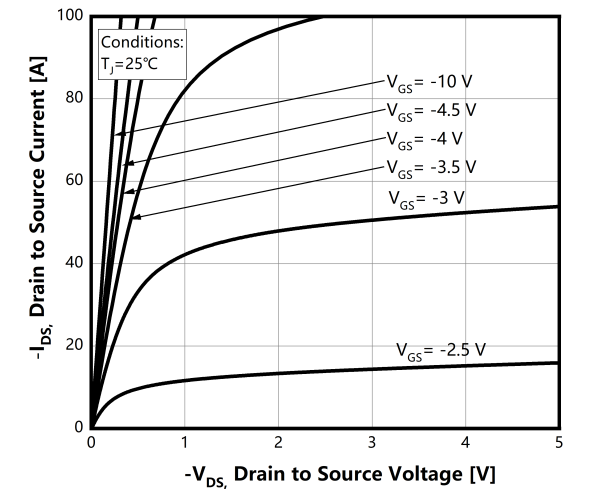


Figure 4 . Transfer Characteristics

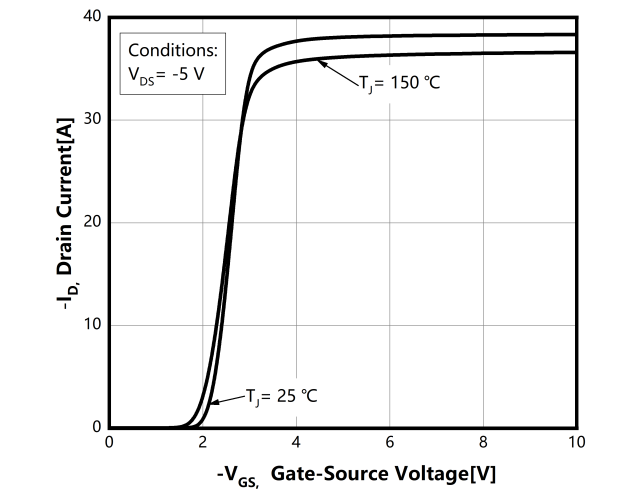


Figure 5 . On-Resistance vs Drain Current

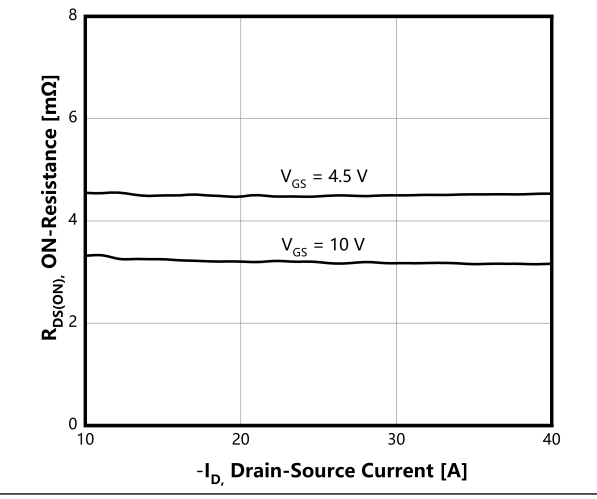
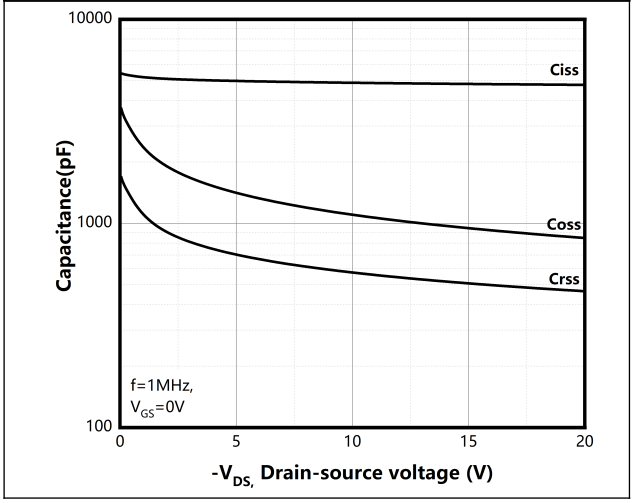


Figure 6 . Capaticance



Typical Performance Characteristics

Figure 7 . Gate Charge

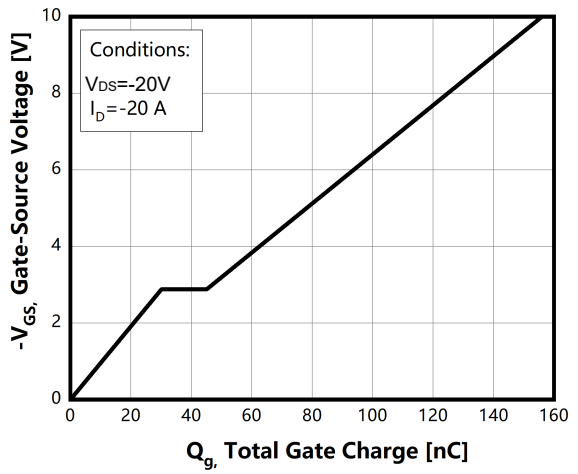


Figure 8 . Body Diode Forward Voltage

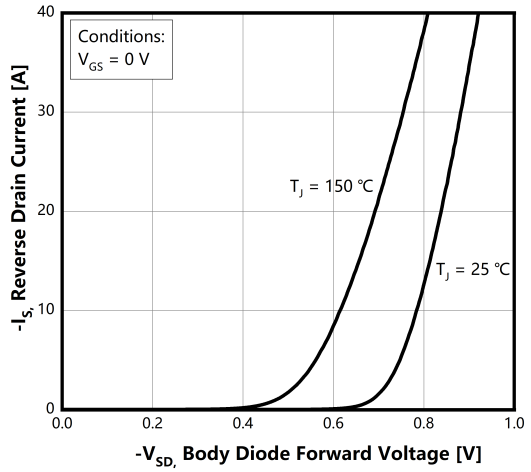


Figure 9. Breakdown Voltage vs Junction Temperature

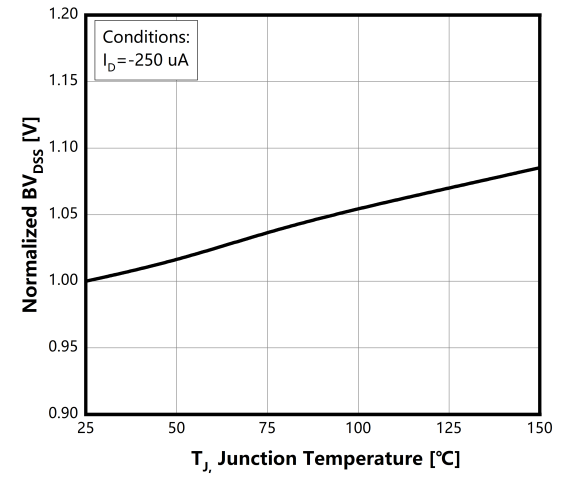


Figure 10. On-Resistance vs Temperature

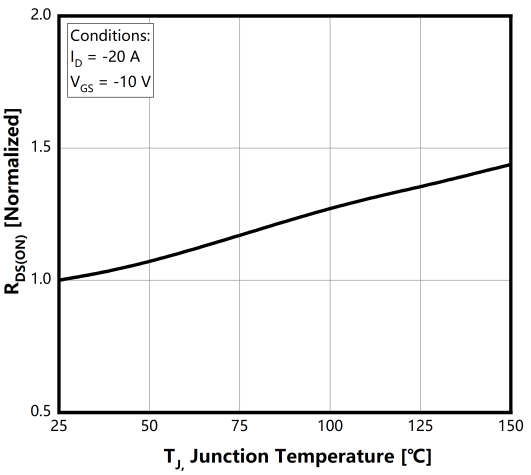
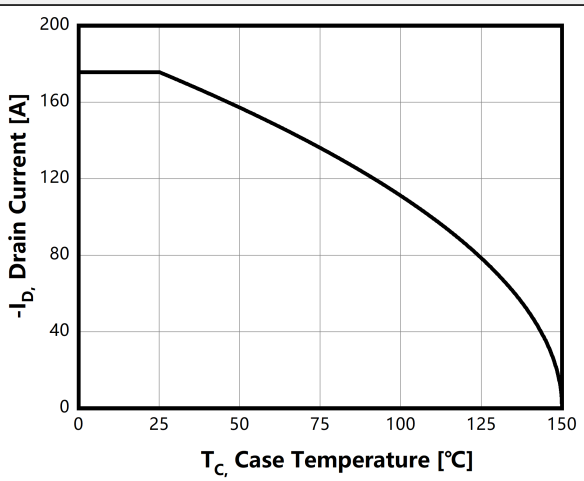


Figure 11. Continuous Drain Current Derating vs. Case Temperature



Test Circuits

Figure 12：Gate Charge Test Circuit and Waveform

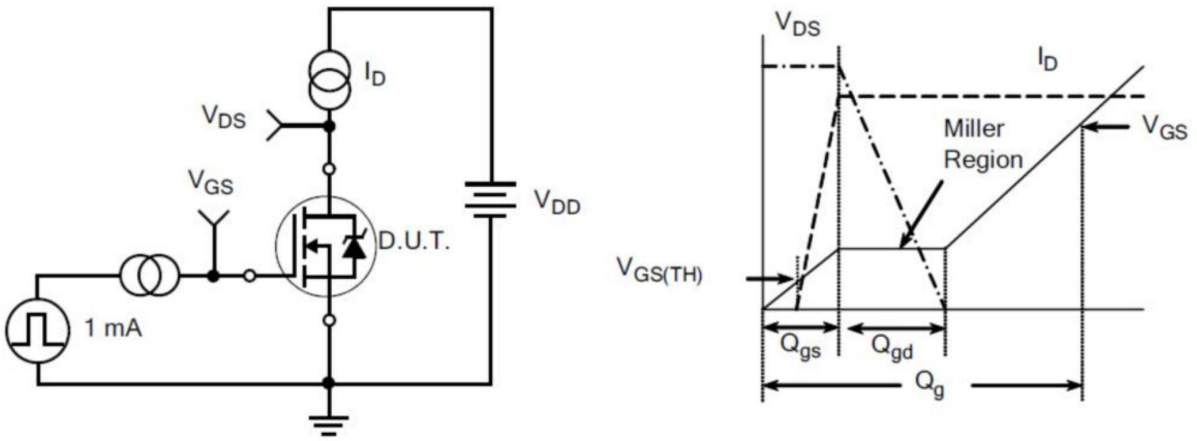


Figure 13：Resistive Switching Test Circuit and Waveform

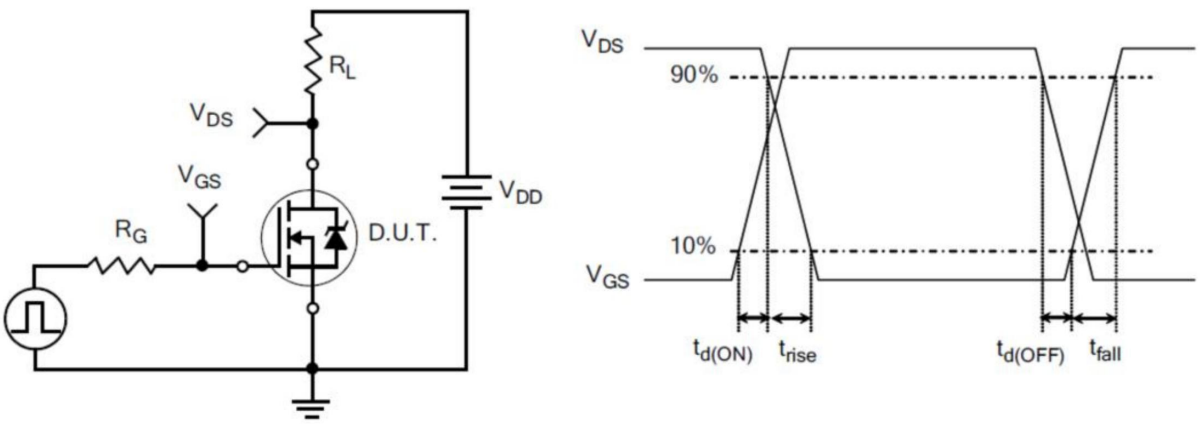
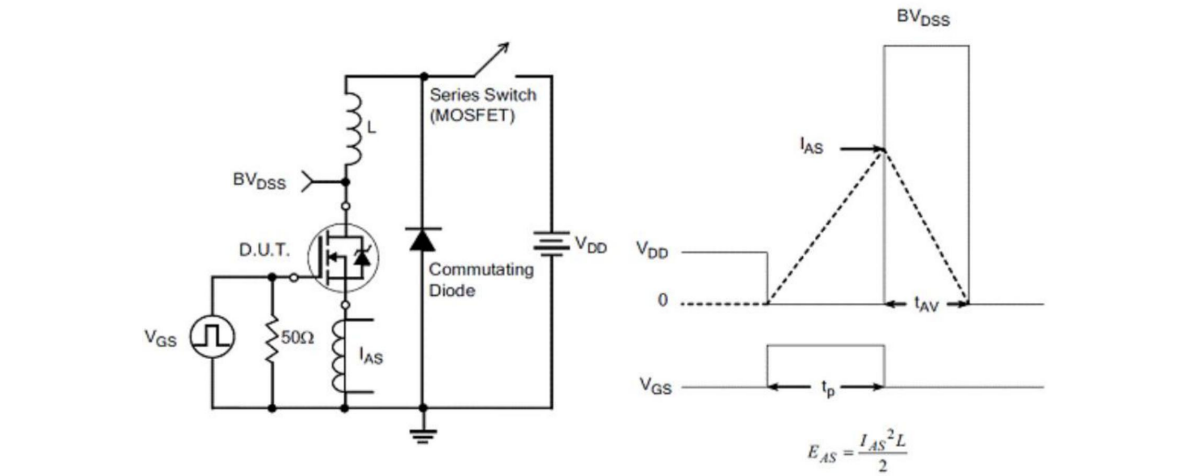
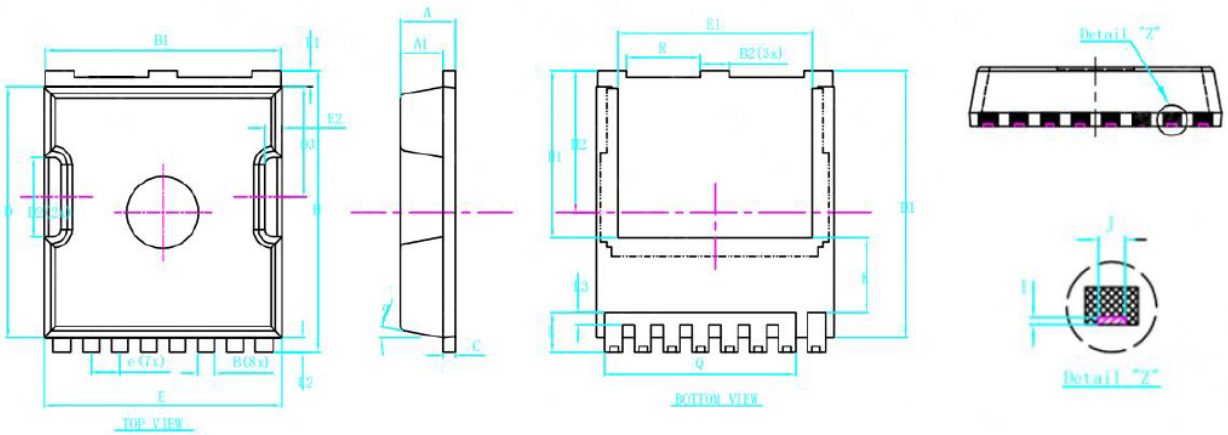


Figure 14：Unclamped Inductive Switching Test Circuit and Waveform



Package Outlines

TOLL



SYMBOL	MILLIMETER		
	MIN.	NOM.	MAX.
A	2.200	2.300	2.400
A1	1.700	1.800	1.900
B	0.700	0.800	0.900
B1	9.700	9.800	9.900
B2	1.100	1.200	1.300
C	0.400	0.500	0.600
D	10.300	10.400	10.500
D1	11.000	11.100	11.200
D2	3.200	3.300	3.400
D3	4.470	4.570	4.670
E	9.800	9.900	10.000
E1	8.000	8.100	8.200
E2	0.500	0.600	0.700
e	1.200 BSC		
H	11.600	11.700	11.800
H1	6.950 BSC		
H2	5.900 BSC		
I	0.050	0.100	0.15
J	0.350 REF.		
K	3.100 REF.		
L	1.550	1.650	1.750
L1	0.600	0.700	0.800
L2	0.500	0.600	0.700
L3	0.400	0.500	0.600
Q	8.000 REF.		
R	3.000	3.100	3.200
a	10° REF.		

Package Marking and Ordering Information

Part Number	Top Marking	Package	Packing Method	Quantity
BTT04PL041SR1	BTT04PL041SR1	TOLL	Tape & Reel	1200 units

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