

BCD65N190Y1

N-Channel Silicon Carbide Power MOSFET

650 V, 19A, 190 mΩ



bestirpower

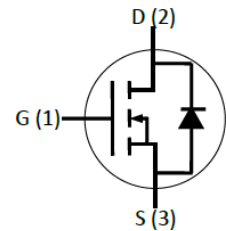
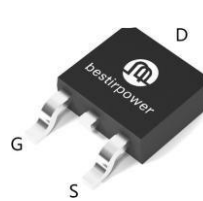
Features

- Revolutionary semiconductor material Silicon Carbide
- High blocking voltage with low on-resistance
- High-speed switching with very low switching losses
- High-speed and high robust intrinsic body diode

$BV_{DSS, T_C=25^\circ C}$	$I_D, T_C=25^\circ C$	$R_{DS(on), typ}$	$Q_{g, typ}$
650 V	19A	190 mΩ	15.3nC

Applications

- LED driver
- PD charger
- PC adapter
- Air-conditioning
- E-bike charger



Absolute Maximum Ratings ($T_J = 25^\circ C$ unless otherwise noted)

Symbol	Parameter	Value	Unit	
V_{DSS}	Drain to Source Voltage	650	V	
V_{GS}	Gate to Source Voltage (DC)	-10/22	V	
V_{GSop}	Recommended Operation Value	0/15	V	
I_D	Drain Current	$V_{GS} = 15 V, (T_C = 25^\circ C)$	19	A
		$V_{GS} = 15 V, (T_C = 100^\circ C)$	13.5	
I_{DM}	Drain Current	Pulsed	33	A
P_D	Power Dissipation	$(T_C = 25^\circ C)$	76	W
		Derate Above $25^\circ C$	0.51	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to 175	°C	

Thermal Characteristics

Symbol	Parameter	Value	Unit
R_{thj-C}	MOSFET/Body Diode Junction-Case Thermal Resistance	1.98	°C/W
T_{sold}	Soldering temperature, wave soldering only allowed at leads	260	°C

Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
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Off Characteristics

BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 100\mu\text{A}$	650	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 650\text{ V}, V_{GS} = 0\text{ V}$	-	0.1	20	μA
I_{GSS}	Gate-Source Leakage Current	$V_{DS} = 0\text{ V}, V_{GS} = +22\text{ V}$	-	-	+250	nA
I_{SGS}	Source-Gate Leakage Current	$V_{DS} = 0\text{ V}, V_{GS} = -10\text{ V}$	-	-	+250	nA

On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 10\text{ mA}, T_J = 25^\circ\text{C}$	-	3.9	-	V
$R_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 15\text{ V}, I_D = 7\text{ A}, T_J = 25^\circ\text{C}$	-	187	215	mΩ
		$V_{GS} = 15\text{ V}, I_D = 7\text{ A}, T_J = 175^\circ\text{C}$	-	175	-	

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{GS} = 0\text{ V}, V_{DS} = 650\text{ V}, f = 1\text{ MHz}$	-	431	-	pF
C_{oss}	Output Capacitance		-	30	-	
C_{riss}	Reverse Capacitance		-	3	-	
$Q_{g(tot)}$	Total Gate Charge	$V_{DS} = 400\text{ V}, I_D = 7\text{ A}, V_{GS} = 0\text{ V} / 15\text{ V}$	-	15.3	-	nC
Q_{gs}	Gate to Source Charge		-	5.5	-	
Q_{gd}	Gate to Drain "Miller" Charge		-	2.6	-	
R_G	Internal Gate Resistance	$f = 1\text{ MHz}, V_{AC} = 25\text{ mV}$	-	36	-	Ω

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{GS} = 0/15\text{ V}, L = 600\mu\text{H}$ $V_{DS} = 400\text{ V}, I_D = 7\text{ A},$ $R_{G(on)} = 2.2\Omega, R_{G(off)} = 2.2\Omega$	-	29.2	-	ns
t_r	Turn-On Rise Time		-	11.7	-	
$t_{d(off)}$	Turn-Off Delay Time		-	46.1	-	
t_f	Turn-Off Fall Time		-	16.5	-	
E_{on}	Turn-On Switching Energy		-	67.8	-	μJ
E_{off}	Turn-Off Switching Energy		-	15	-	

Source-Drain Diode Characteristics

V_{SD}	Body Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_{SD} = 3.5\text{ A}, T_C = 25^\circ\text{C}$	-	3.3	-	V
		$V_{GS} = 0\text{ V}, I_{SD} = 3.5\text{ A}, T_C = 175^\circ\text{C}$	-	2.8	-	V
t_{rr}	Reverse Recovery Time	$V_{DS} = 400\text{ V}, V_{GS} = 0\text{ V}, I_{SD} = 7\text{ A},$ $di/dt = 1.2\text{ kA}/\mu\text{s}$	-	26	-	ns
Q_{rr}	Reverse Recovery Charge		-	68	-	nC
I_{rrm}	Peak Reverse Recovery Current		-	6.9	-	A

Typical Performance Characteristics

Figure 1. Safe operating area (SOA)

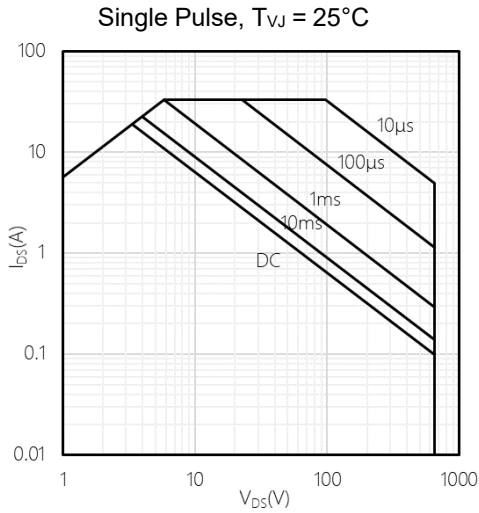


Figure 2. Power dissipation as a function of case temperature limited by bond wire

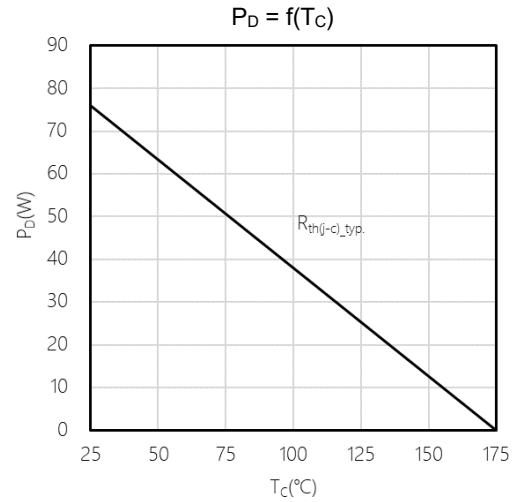


Figure 3. Typical output characteristic, VGS as parameter

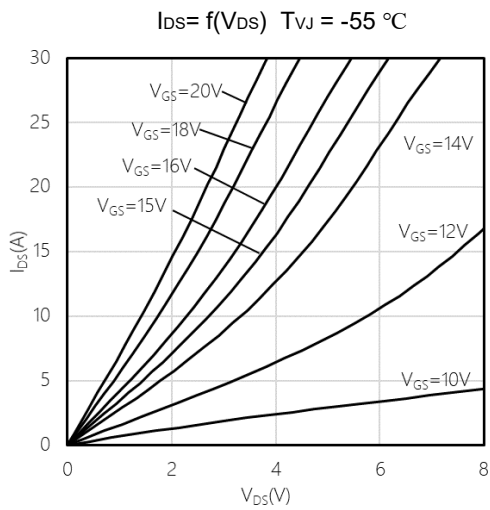


Figure 4. Typical output characteristic, VGS as parameter

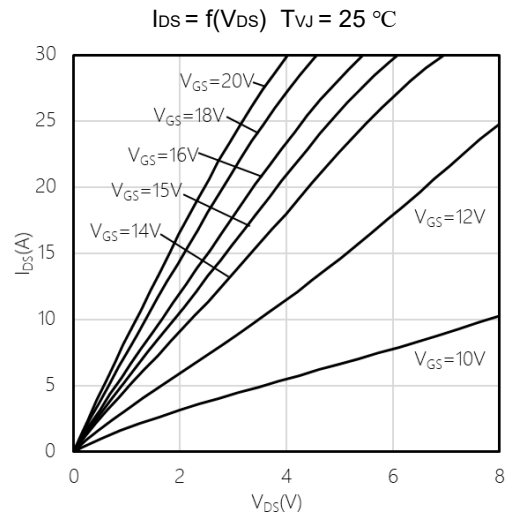


Figure 5. Typical output characteristic, VGS as parameter

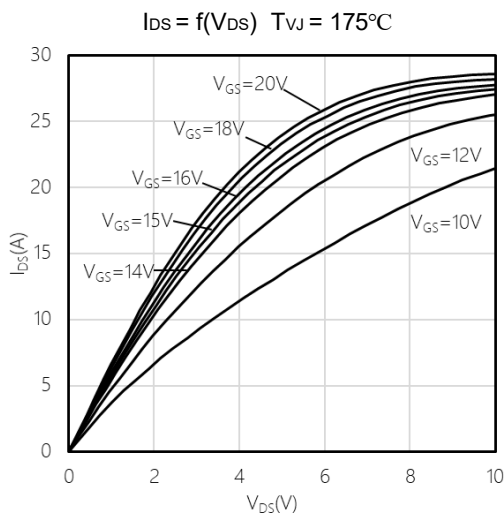
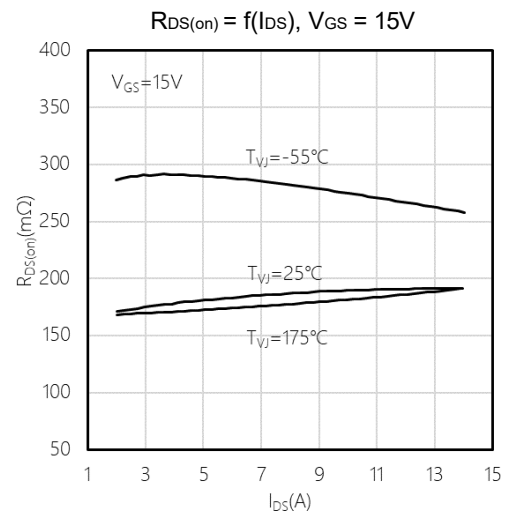


Figure 6. Typical on-state resistance as a function of drain current



Typical Performance Characteristics

Figure 7. Typical on-state resistance as a function of temperature

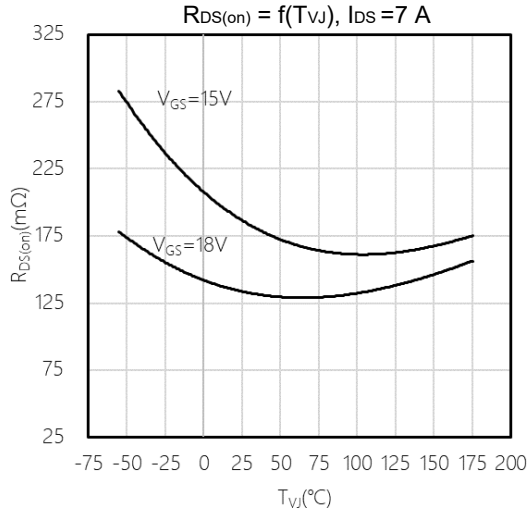


Figure 8. Typical on-state resistance as a function of V_{GS}

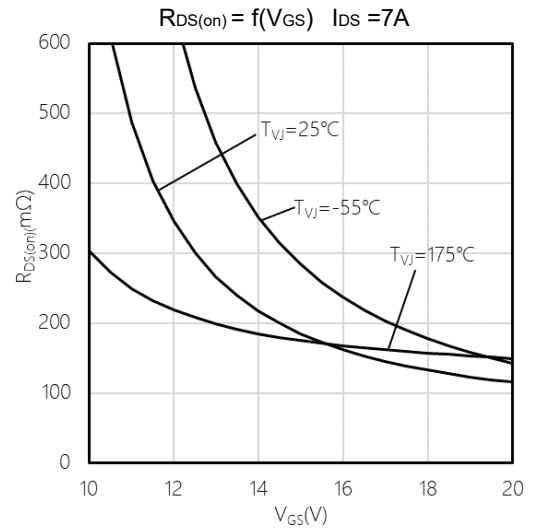


Figure 9. Typical transfer characteristic

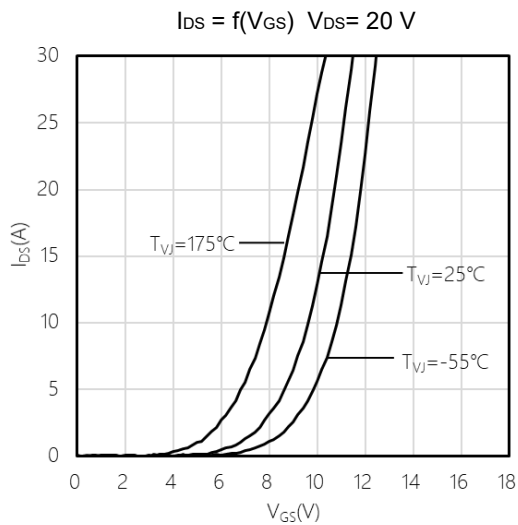


Figure 10. Typical gate-source threshold voltage as a function of junction temperature

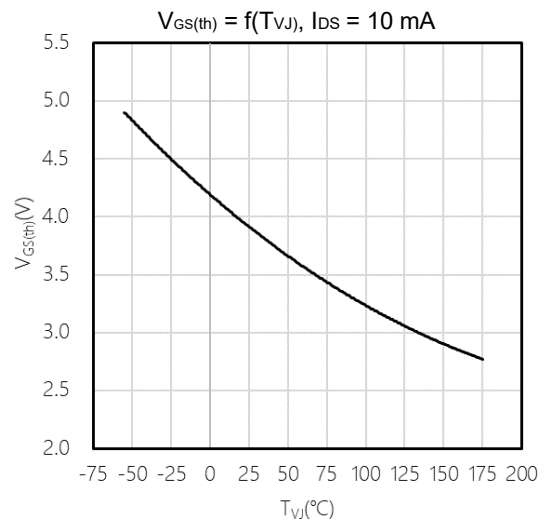


Figure 11. Typical reverse drain current as function of reverse drain voltage, V_{GS} as parameter

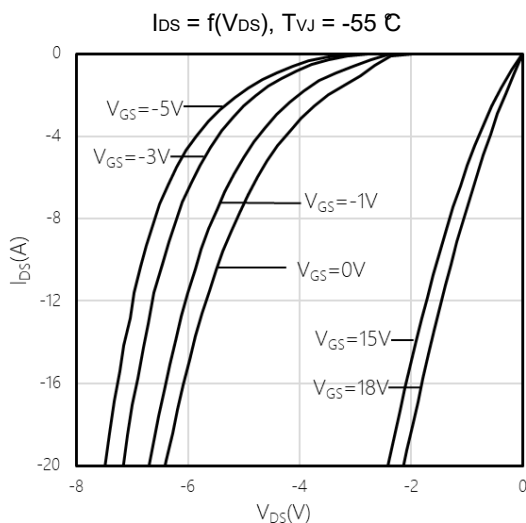
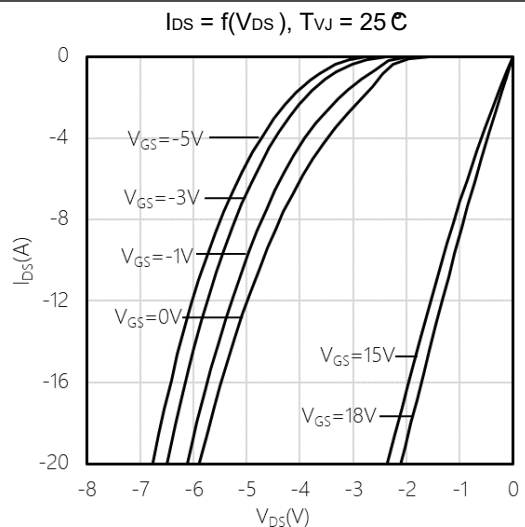


Figure 12. Typical reverse drain current as function of reverse drain voltage, V_{GS} as parameter



Typical Performance Characteristics

Figure 13. Typical reverse drain current as function of reverse drain voltage, VGS as parameter

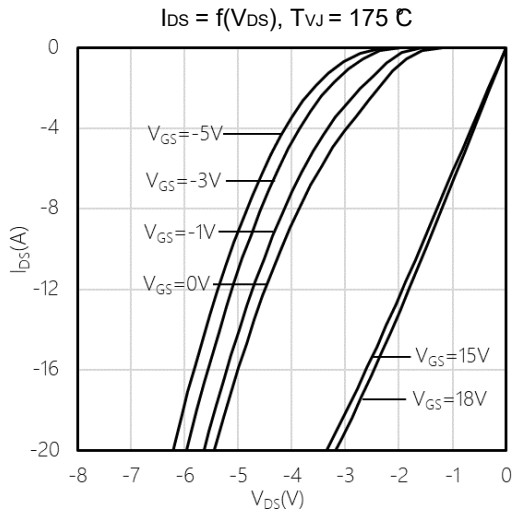


Figure 14. Typical reverse drain voltage as function of junction temperature

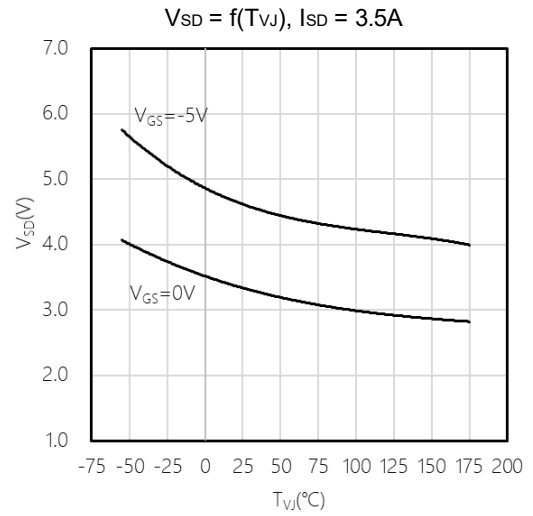


Figure 15. Typical switching energy as a function of junction temperature

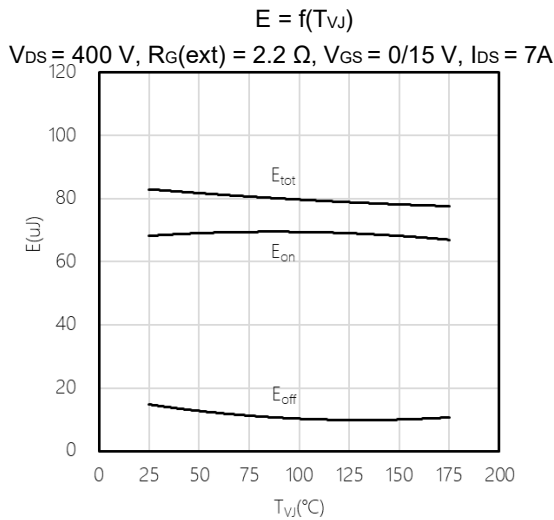


Figure 16. Typical switching energy losses as a function of gate resistance

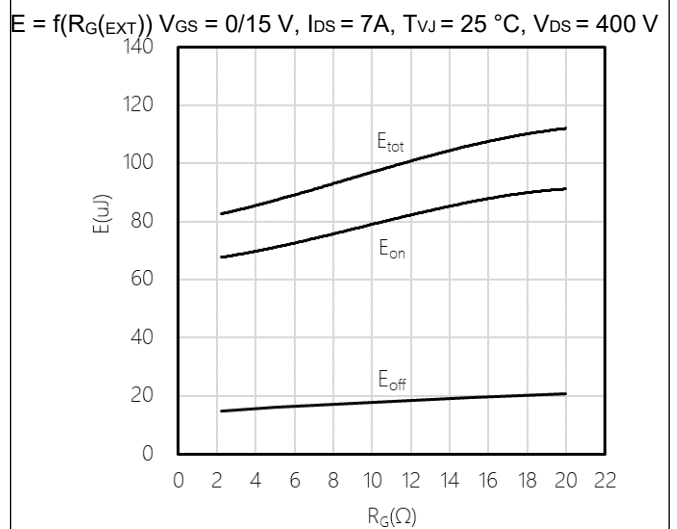


Figure 17. Typical switching energy losses as a function of gate resistance

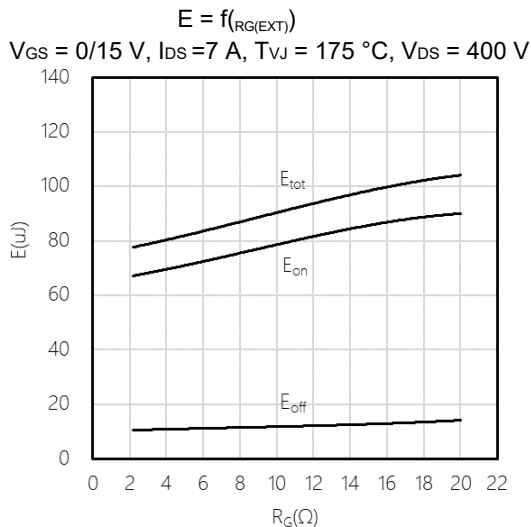
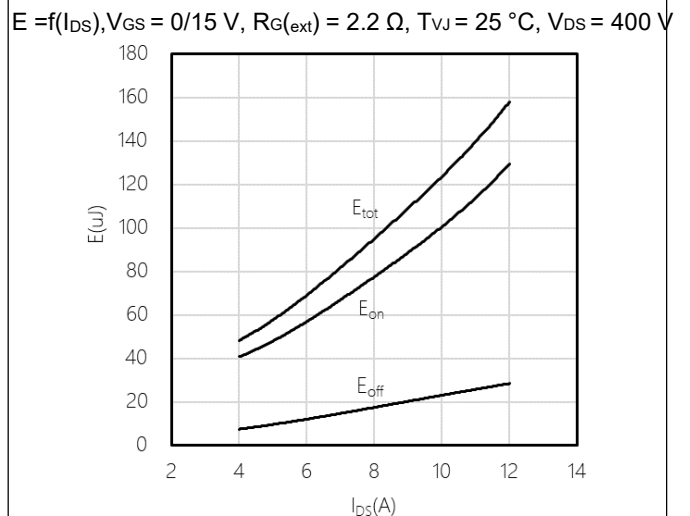


Figure 18. Typical switching energy losses as a function of I_DS



Typical Performance Characteristics

Figure 19. Typical switching energy losses as a function of I_{DS}

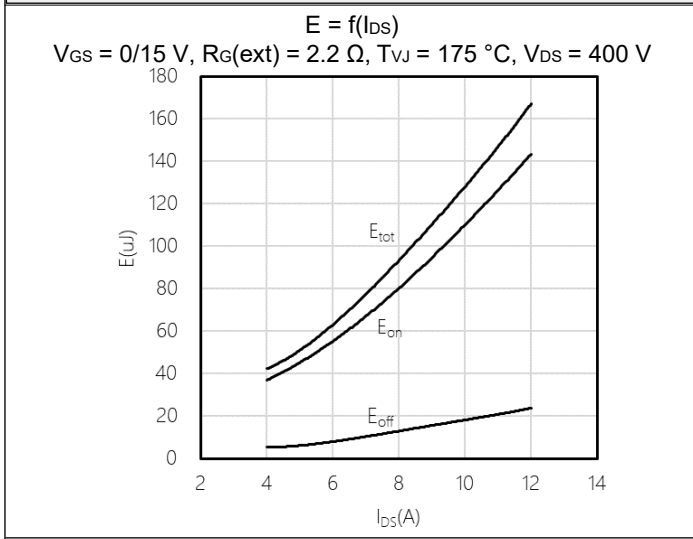


Figure 20. Typical switching energy losses as a function of V_{DS}

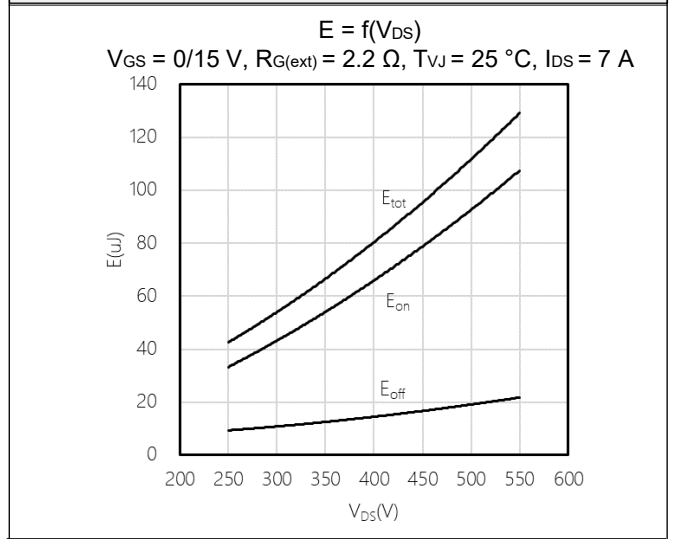


Figure 21. Typical switching energy losses as a function of V_{DS}

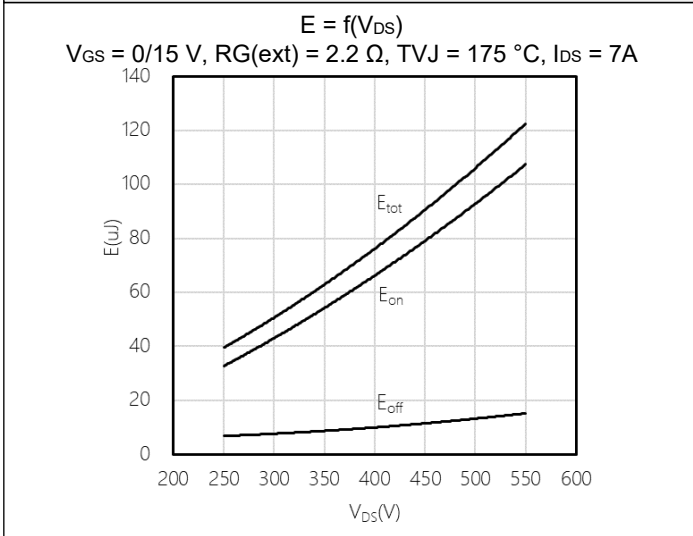


Figure 22. Typical gate charge

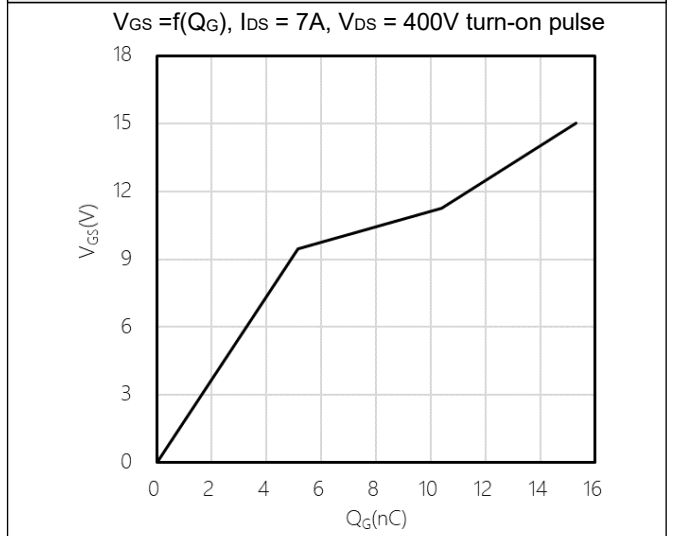


Figure 23. Typical capacitance as a function of drain-source voltage

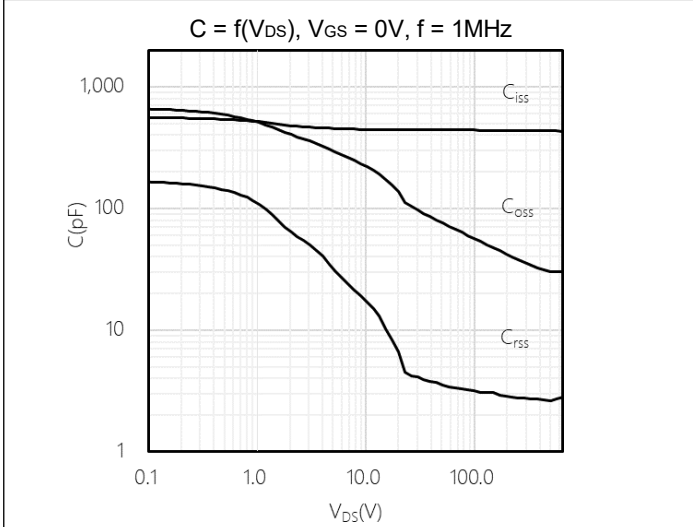
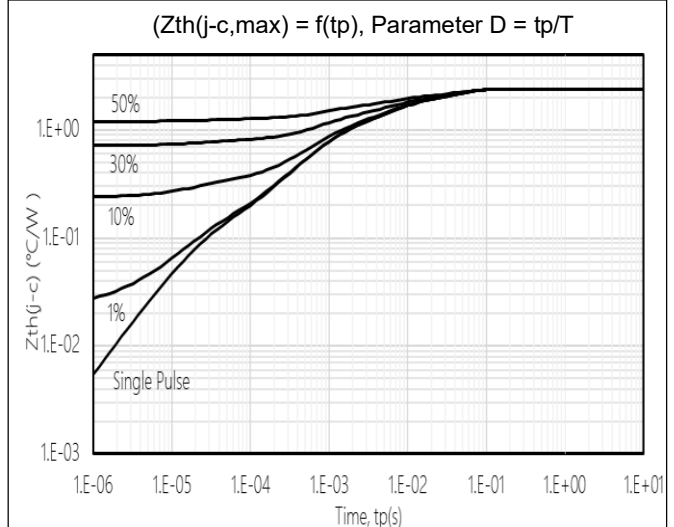
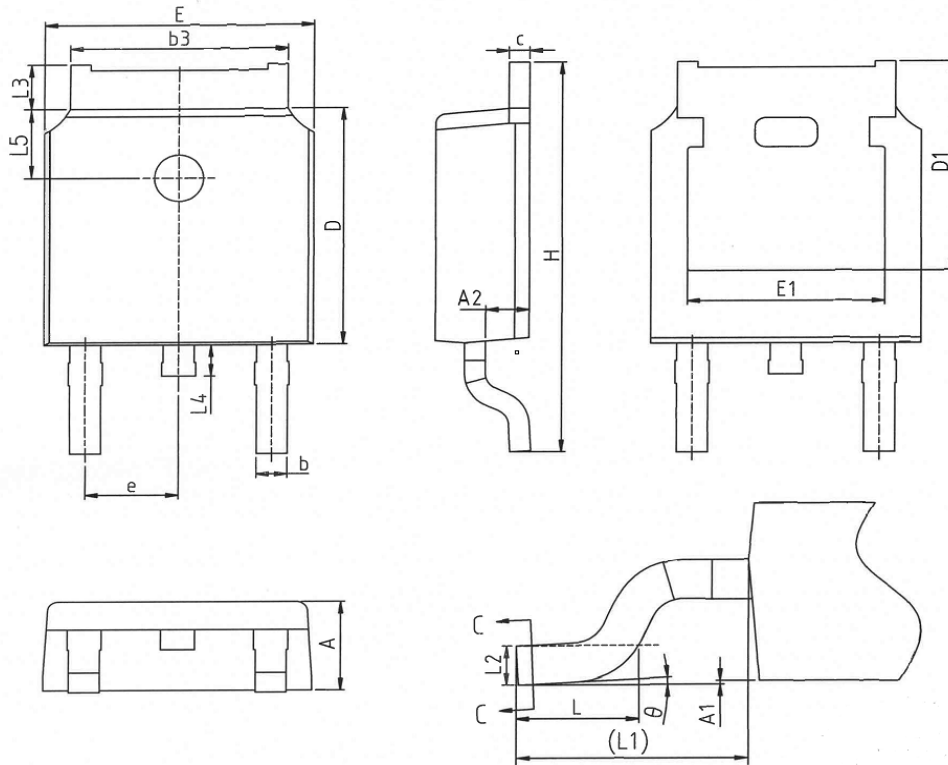


Figure 24. Transient thermal resistance (MOSFET)



Package Outlines

D-Pak



COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
A	2.20	2.30	2.38
A1	0.00	-	0.12
A2	0.97	1.07	1.17
b	0.68	0.78	0.90
b3	5.20	5.33	5.46
c	0.43	0.53	0.61
D	5.98	6.10	6.22
D1	5.30REF		
E	6.40	6.60	6.73
E1	4.63	-	-
e	2.286BSC		
H	9.40	10.10	10.50
L	1.38	1.50	1.75
L1	2.90REF		
L2	0.51BSC		
L3	0.88	-	1.28
L4	0.50	-	1.00
L5	1.65	1.80	1.95
θ	0°	-	8°

* Dimensions in millimeters

Package Marking and Ordering Information

Part Number	Top Marking	Package	Packing Method	Quantity
BCD65N180Y1	BCD65N180Y1	DPAK	Tape & Reel	2500 units

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