BCD65N260Y1

N-Channel Silicon Carbide Power MOSFET

650 V, 15.5 A, 260 mΩ

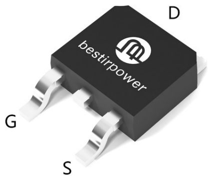
Features

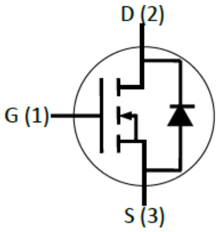
- Revolutionary semiconductor material Silicon Carbide
- High blocking voltage with low on-resistance
- High-speed switching with very low switching losses
- High-speed and high robust intrinsic body diode

$BV_{DSS,\ Tc=25℃}$	$I_{D,\ Tc=25℃}$	$R_{DS(on),typ}$	$Q_{g,typ}$
650 V	15.5A	260 mΩ	12.5 nC

Applications

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





Absolute Maximum Ratings (TJ = 25℃ 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℃)	15.5	A
		V_{GS} = 15 V,(T_C = 100℃)	11	
I_{DM}	Drain Current	Pulsed	25	A
P_D	Power Dissipation	(T_C = 25℃)	67	W
		Derate Above 25℃	0.45	W/℃
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to 175	℃

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{θJC}$	Thermal Resistance, Junction to Case, Max.	2.67	℃/W
Tsold	Soldering temperature, wave soldering only allowed at leads	260	℃

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 = 100 uA	650	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 650 V, V_{GS} = 0 V	-	0.1	20	μA
I_{GSS}	Gate-Source Leakage Current	V_{DS} = 0 V, V_{GS} = + 22 V	-	-	+250	nA
I_{SGS}	Source-Gate Leakage Current	V_{DS}= 0 V, V_{GS}= - 10 V	-	-	+250	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_{DS} = 10 mA, T_J = 25˚C	3.2	4.1	5	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 15 V, I_D = 5 A	-	260	300	mΩ
		V_{GS} = 15 V, I_D = 5 A, T_J = 175℃	-	231	-	
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = 650 V, f = 1MHz	-	294	-	pF
C_{oss}	Output Capacitance		-	25	-	
C_{rss}	Reverse Capacitance		-	4	-	
$Q_{g(tot)}$	Total Gate Charge	V_{DS} = 400 V, I_D = 5 A, V_{GS} = 0V / 15 V	-	12.5	-	nC
Q_{gs}	Gate to Source Charge		-	4.3	-	
Q_{gd}	Gate to Drain "Miller" Charge		-	1.6	-	
R_G	Internal Gate Resistance	f = 1MHz,V_{AC} = 25 mV	-	25.5	-	Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{GS} = 0/15 V, L=600 μH V_{DS} = 400 V, I_D = 5 A, $R_{G(on)}$ = 2.2 Ω, $R_{G(off)}$ = 2.2 Ω	-	6.6	-	ns
t_r	Turn-On Rise Time		-	18.3	-	
$t_{d(off)}$	Turn-Off Delay Time		-	17.7	-	
t_f	Turn-Off Fall Time		-	32.1	-	
E_{on}	Turn-On Switching Energy		-	43.2	-	μJ
E_{off}	Turn-Off Switching Energy		-	5.5	-	
Source-Drain Diode Characteristics						
I_{SD}	Continuous Diode Forward Current	T_C = 25˚C	-	12	-	A
		T_C = 100˚C	-	7	-	
V_{SD}	Diode Forward Voltage	V_{GS} = 0 V, I_{SD} = 2.5 A	-	3.3	-	V
t_{rr}	Reverse Recovery Time	V_{DS} = 400 V, V_{GS} = 0 V, I_{SD} =5 A, di/dt = 1.6 kA/μs	-	9.9	-	ns
Q_{rr}	Reverse Recovery Charge		-	32.6	-	nC
I_{rrm}	Peak Reverse Recovery Current		-	5.8	-	A

Typical Performance Characteristics

Figure 1. Safe operating area (SOA)

Rth(j-c) =2.67 °C/W, Single Pulse, TVJ = 25°C

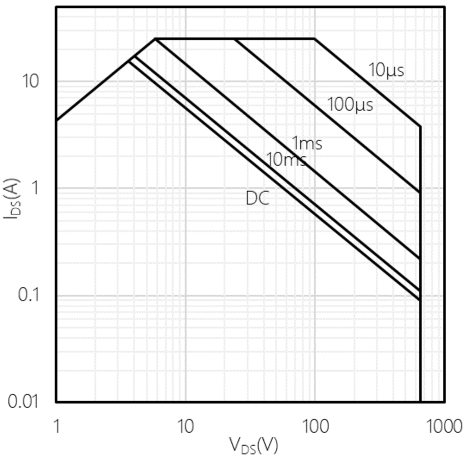


Figure 2. Power dissipation as a function of case temperature limited by bond wire

PD = f(TC)

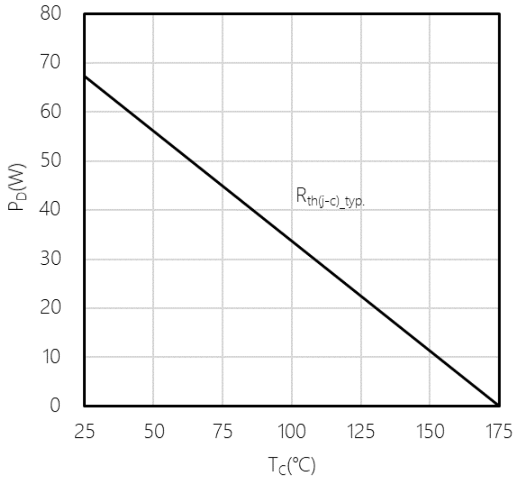


Figure 3. Typical output characteristic, VGS as parameter

I_{DS}= f(V_{DS}) T_{VJ} = -55 ℃

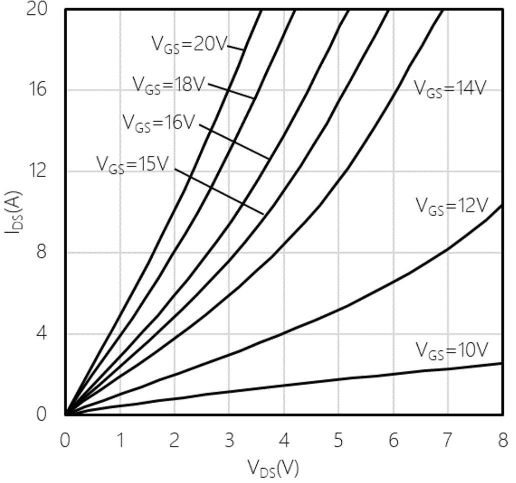


Figure 4. Typical output characteristic, VGS as parameter

I_{DS} = f(V_{DS}) T_{VJ} = 25 ℃

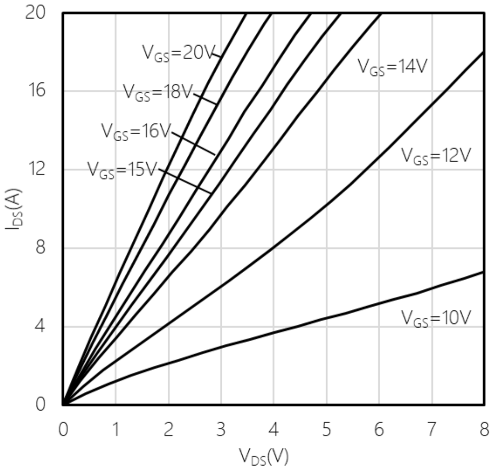


Figure 5. Typical output characteristic, VGS as parameter

I_{DS} = f(V_{DS}) T_{VJ} = 175 ℃

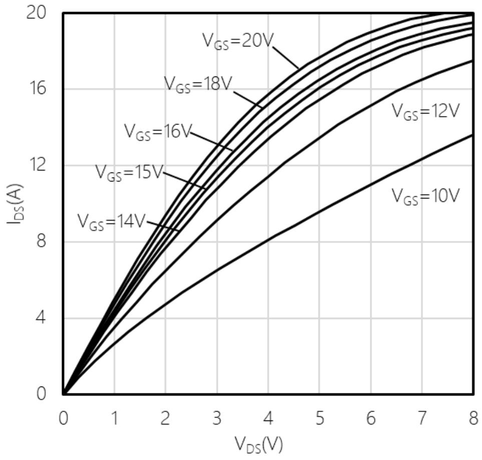
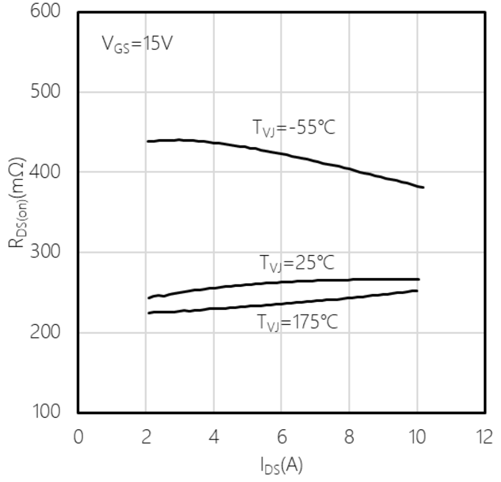


Figure 6. Typical on-state resistance as a function of drain current

$R_{DS(on)}$ = f(I_{DS}), V_{GS} = 15V



Typical Performance Characteristics

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

$R_{DS(on)} = f(T_{VJ})$, I_{DS} =5 A

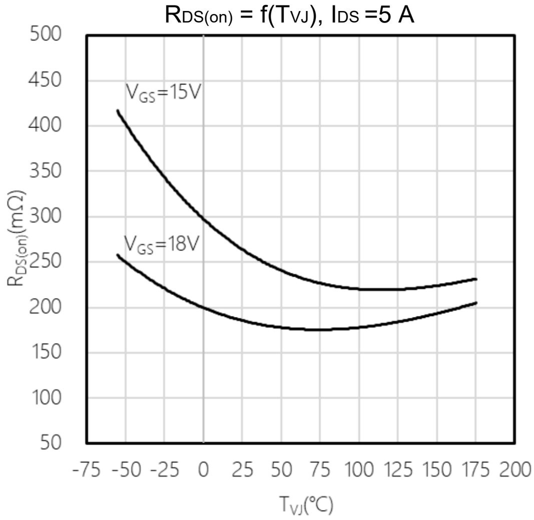


Figure 8. Typical on-state resistance as a function of V_{GS}

$R_{DS(on)} = f(V_{GS})$ I_{DS} =5 A

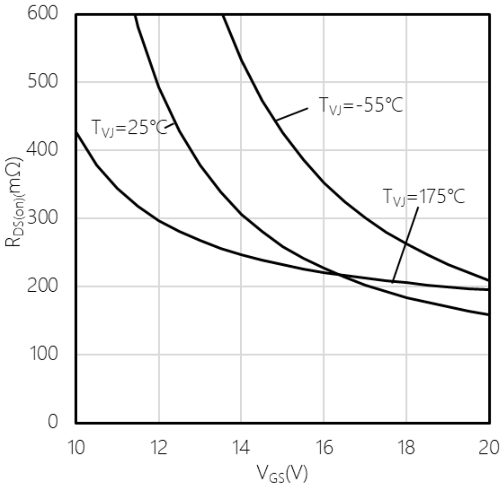


Figure 9. Typical transfer characteristic

$I_{DS} = f(V_{GS})$ V_{DS}= 20 V

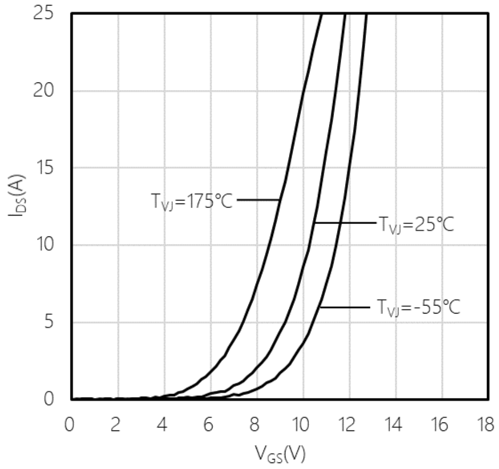


Figure 10. Typical gate-source threshold voltage as a function of junction temperature

$V_{GS(th)} = f(T_{VJ})$, I_{DS} = 10 mA

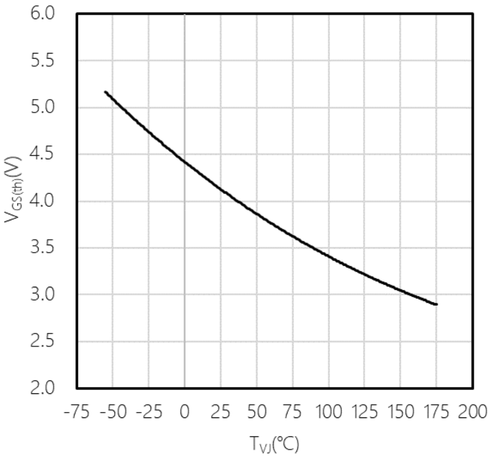


Figure 11. Typical reverse drain current as function of reverse drain voltage, V_{GS} as parameter

$I_{DS} = f(V_{DS})$, T_{VJ} = -55 °C

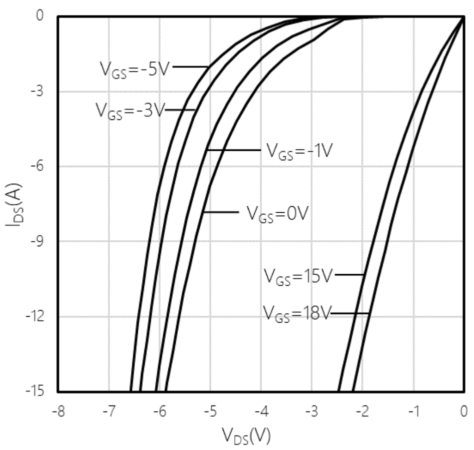
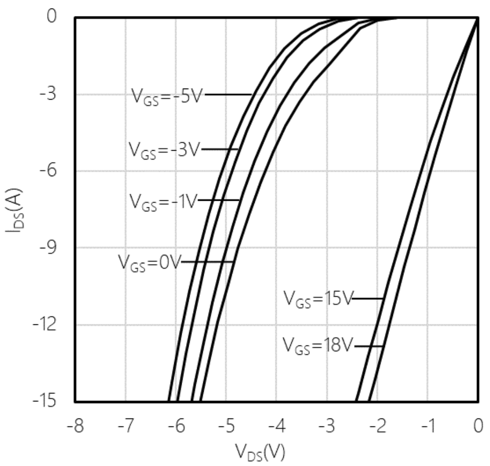


Figure 12. Typical reverse drain current as function of reverse drain voltage, V_{GS} as parameter

$I_{DS} = f(V_{DS})$, T_{VJ} = 25 °C



Typical Performance Characteristics

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

I_{DS} = f(V_{DS}), T_{VJ} = 175 °C

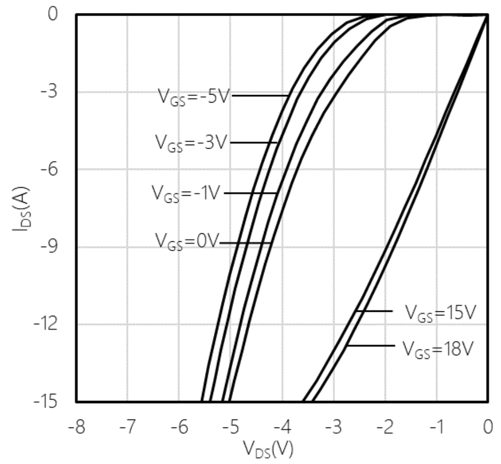


Figure 14. Typical reverse drain voltage as function of junction temperature

V_{SD} = f(T_{VJ}), I_{SD} = 2.5 A

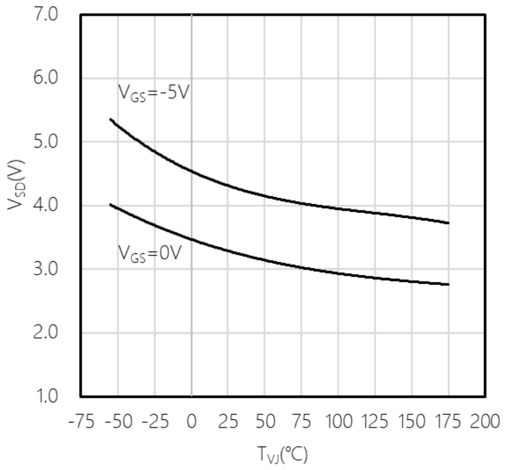


Figure 15. Typical switching energy as a function of junction temperature

E = f(TVJ)
V_{DS} = 400 V, R_G(ext) = 2.2 Ω, V_{GS} = 0/15 V, I_{DS} = 5 A

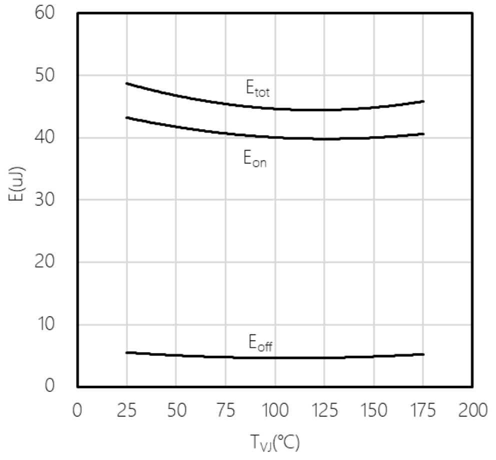


Figure 16. Typical switching energy losses as a function of gate resistance

E = f(RG(ext))
V_{GS} = 0/15 V, I_{DS} = 5 A, T_{VJ} = 25 °C, V_{DS} = 400 V

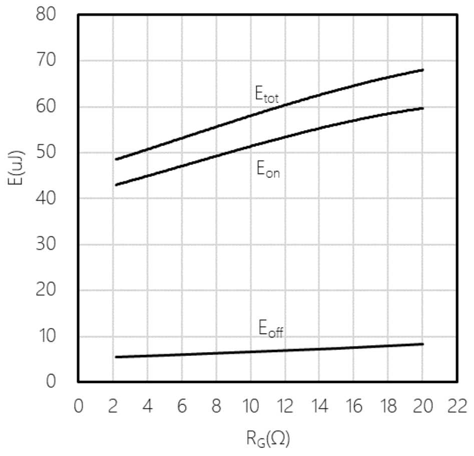


Figure 17. Typical switching energy losses as a function of gate resistance

E = f(R_G(ext))
V_{GS} = 0/15 V, I_{DS} = 5 A, T_{VJ} = 175 °C, V_{DS} = 400 V

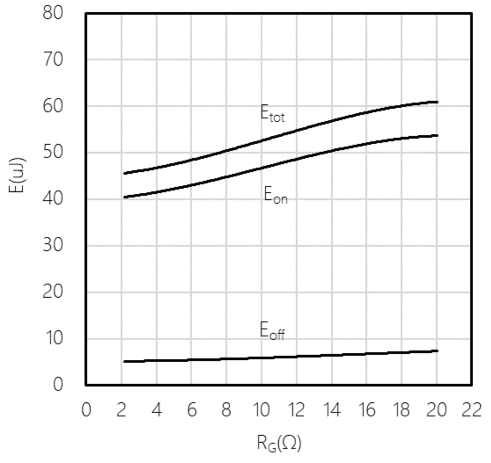
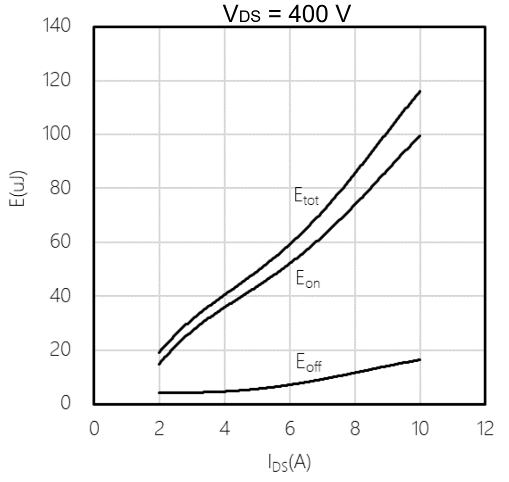


Figure 18. Typical switching energy losses as a function of IDS

E = f(IDS) V_{GS} = 0/15 V, R_G(ext) = 2.2 Ω, T_{VJ} = 25 °C, V_{DS} = 400 V



Typical Performance Characteristics

Figure 19.Typical switching energy losses as a function of IDS

E = f(VDS)
V_{GS} = 0/15 V, R_G(ext) = 2.2 Ω, T_{VJ} = 175 °C, I_{DS} = 5 A

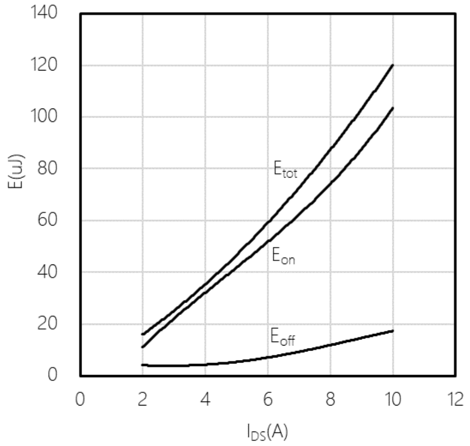


Figure 20. Typical switching energy losses as a function of VDS

E = f(VDS)
V_{GS} = 0/15 V, $R_{G(ext)}$ = 2.2 Ω, T_{VJ} = 25 °C, I_{DS} = 5 A

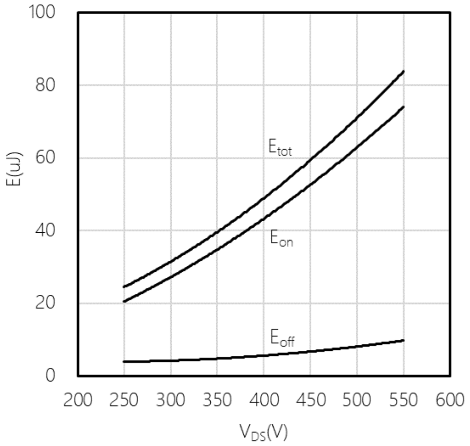


Figure 21. Typical switching energy losses as a function of VDS

E = f(VDS)
V_{GS} = 0/15 V, RG(ext) = 2.2 Ω, TVJ = 175 °C, I_{DS} = 5 A

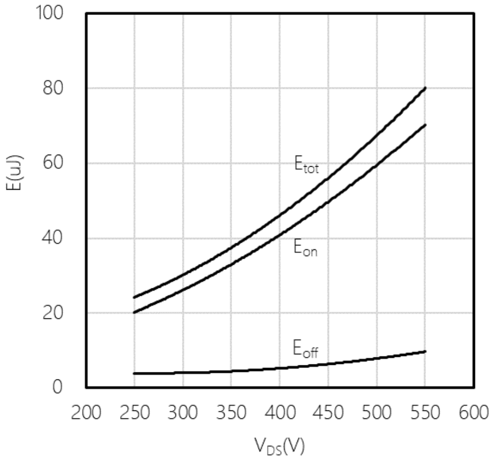


Figure 22. Typical gate charge

V_{GS} =f(QG), I_{DS} = 5 A, V_{DS} = 400V turn-on pulse

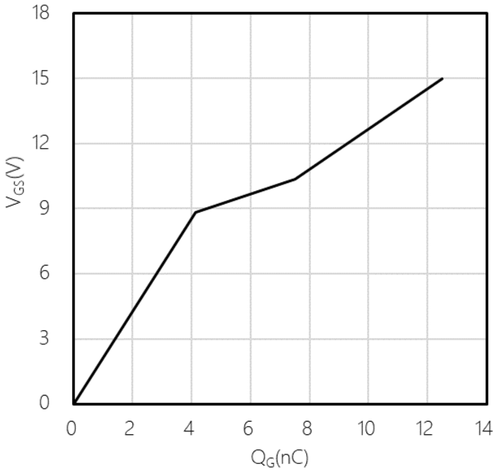


Figure 23. Typical capacitance as a function of drain-source voltage

C = f(V_{DS}), V_{GS} = 0V, f = 1MHz

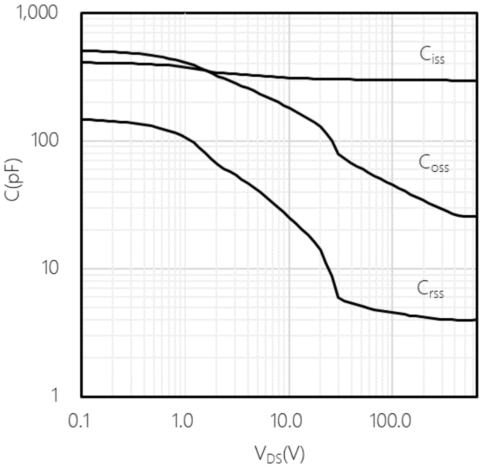
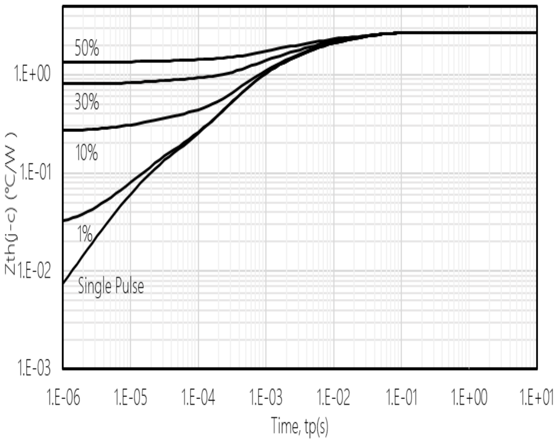


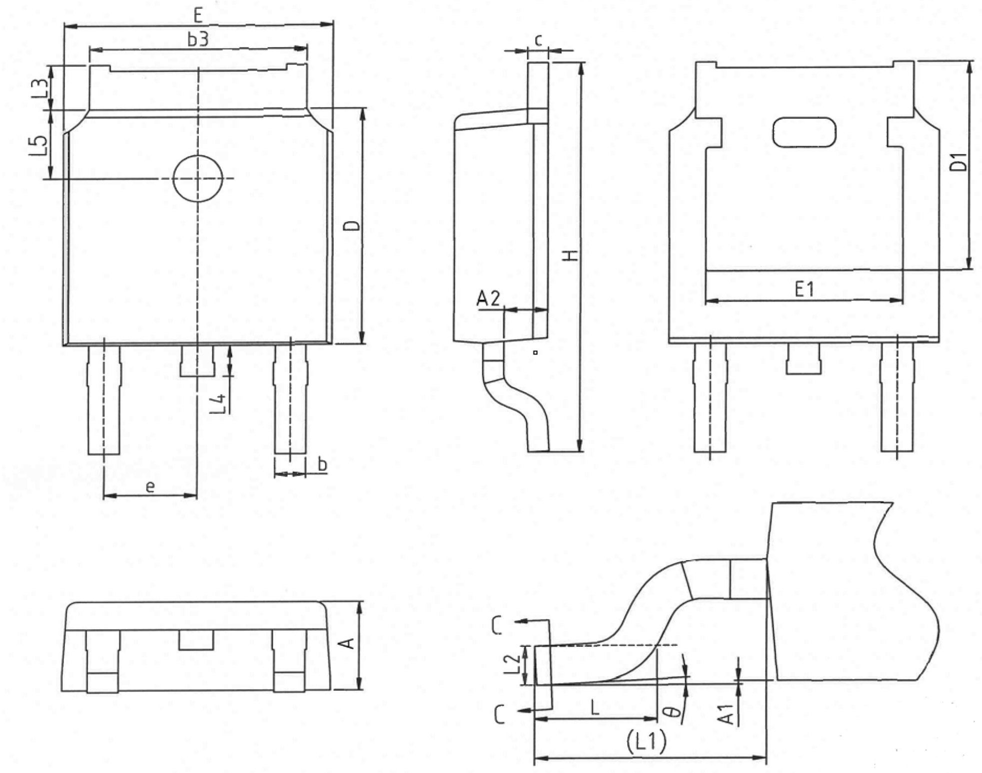
Figure 24. Transient thermal resistance (MOSFET)

(Zth(j-c,max) = f(tp), Parameter D = tp/T



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
BCD65N260Y1	BCD65N260Y1	DPAK	Tape & Reel	2500 units

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