

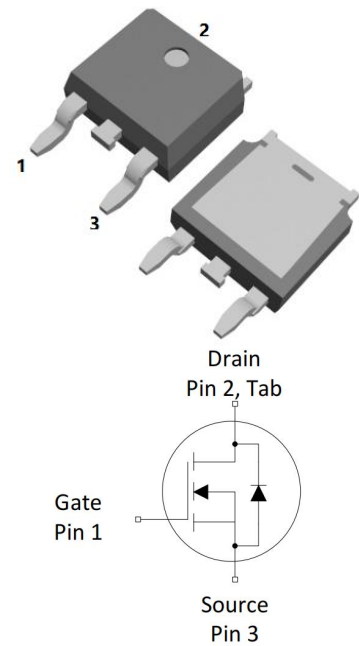
Description:

This N-Channel SiC uses advanced Planar technology and design to provide excellent $R_{DS(on)}$ with low gate charge.

It can be used in a wide variety of applications.

Features:

- 1) $V_{DS}=650V, I_D=20A, R_{DS(ON)} < 160m\ \Omega @ V_{GS}=18V$ (Typ: $120m\ \Omega$)
- 2) Low gate charge.
- 3) Green device available.
- 4) Advanced high cell density Planar technology for ultra low $R_{DS(ON)}$.
- 5) Excellent package for good heat dissipation.
- 6) 0 V turn-off gate voltage can be applied



Package Marking and Ordering Information:

Part NO.	Marking	Package	Packing
D0C160N65F3A	C160N65F3A	TO- 252	2500 pcs/Reel

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

Symbol	Parameter	Ratings	Units
V_{DS}	Drain-Source Voltage	650	V
V_{GS}	Gate-Source Voltage	-10/+22	V
V_{GSOP}	Recommended Operation Value	0/+15	
I_D	Continuous Drain Current ¹	20	A
	Continuous Drain Current- $T_C=100^\circ C$ ¹	14	
I_{DM}	Pulsed Drain Current ²	40	
E_{AS}	Single pulse avalanche energy ³	28	mJ
P_D	Power Dissipation	82	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55-+175	$^\circ C$

Thermal Characteristics:

Symbol	Parameter	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.83	$^\circ C/W$

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV _{DSS}	Drain-Sourctce Breakdown Voltage	V _{GS} =0V, I _D =100 μ A	650	---	---	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{GS} =0V, V _{DS} =650V	---	---	10	μ A
I _{GSS}	Gate-Source Leakage Current	V _{GS} =-10/+22V, V _{DS} =0A	---	---	±100	nA
On Characteristics						
V _{GS(th)}	Gate-Source Threshold Voltage	V _{GS} =V _{DS} , I _D =250 μ A	2.5	3.3	4	V
R _{DS(on)}	Drain-Source On Resistance ⁴	V _{GS} =18V, I _D =4.5A	---	120	160	m Ω
		V _{GS} =15V, I _D =4.5A	---	160	208	m Ω
g _{fs}	Transconductance	V _{DS} =20V, I _D =5A	---	6.9	---	S
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =400V, V _{GS} =0V, f=1MHz	---	440	---	pF
C _{oss}	Output Capacitance		---	31	--	
C _{rss}	Reverse Transfer Capacitance		---	2.8	---	
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DS} =400V, I _D =10A, R _{ENG} =2.2 Ω ,V _{GS} =0/15V	---	22	---	ns
t _r	Rise Time		---	15	---	ns
t _{d(off)}	Turn-Off Delay Time		---	28	---	ns
t _f	Fall Time		---	14	---	ns
Q _g	Total Gate Charge	V _{GS} =0/15V, V _{DS} =400V, I _D =10A	---	14.5	---	nC
Q _{gs}	Gate-Source Charge		---	5.7	---	nC
Q _{gd}	Gate-Drain “Miller” Charge		---	2.3	---	nC
R _G	Internal Gate Resistance	f=1MHz,V _{AC} =25mV	---	28.5	---	Ω

Drain-Source Diode Characteristics						
V_{SD}	Diode Forward Voltage	V _{GS} =0V, I _{SD} =3A	---	3.5	---	V
I_S	Continuous Drain Current	V _D =V _G =0V	---	---	14	A
I_{SM}	Pulsed Drain Current		---	---	28	A
T_{rr}	Reverse Recovery Time	I _{SD} =10A, V _{DD} =400A dI/dt=1000A/us, Includes Q _{oss}	---	6.9	---	ns
Q_{rr}	Reverse Recovery Charge		---	26	---	nC
T_{rrm}	Peak Reverse Recovery Current		---	4.8	---	A

Notes:

1. Computed continuous current assumes the condition of $T_{j,Max}$ while the actual continuous current depends on the thermal & electro-mechanical application board design
2. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
3. EAS condition : $T_J=25^{\circ}C, V_{DD}=325V, V_G=18V, L=0.5mH$
4. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

Typical Characteristics: ($T_C=25^{\circ}C$ unless otherwise noted)

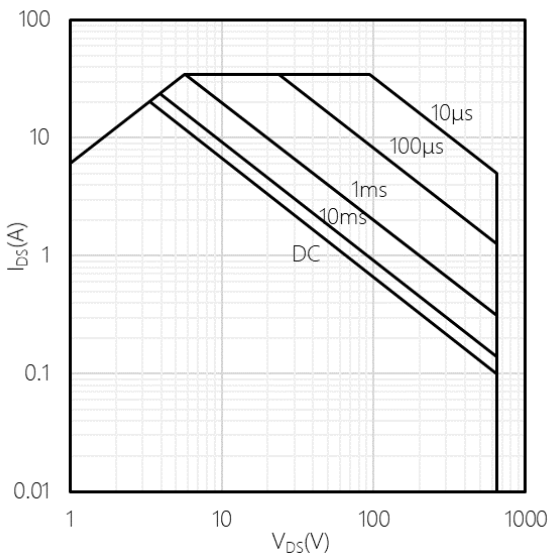


Figure1: Safe operating area (SOA)

$R_{th(j-c)} = 2.2^{\circ}C/W$, Single Pulse, $T_{vj} = 25^{\circ}C$

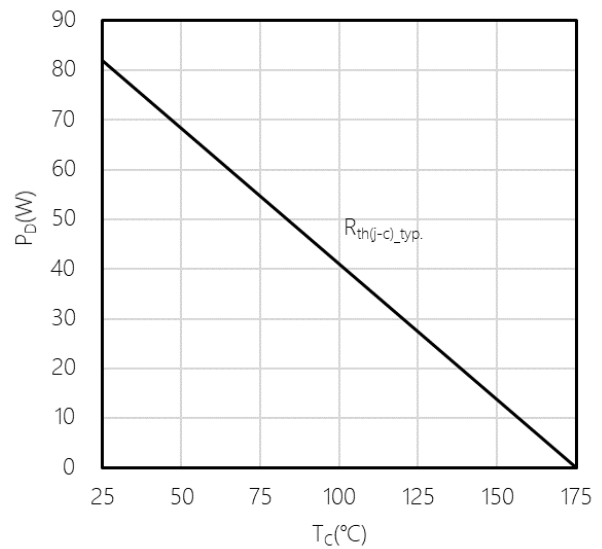


Figure 2: Power dissipation as a function of case temperature limited by bond wire

$P_D = f(T_C)$

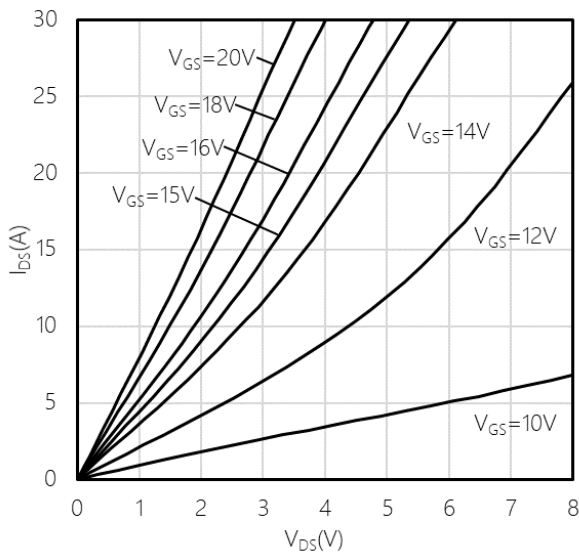


Figure 3: Typical output characteristic, V_{GS} as parameter

$$I_{DS} = f(V_{DS})$$

$$T_{VJ} = -55^{\circ}\text{C}$$

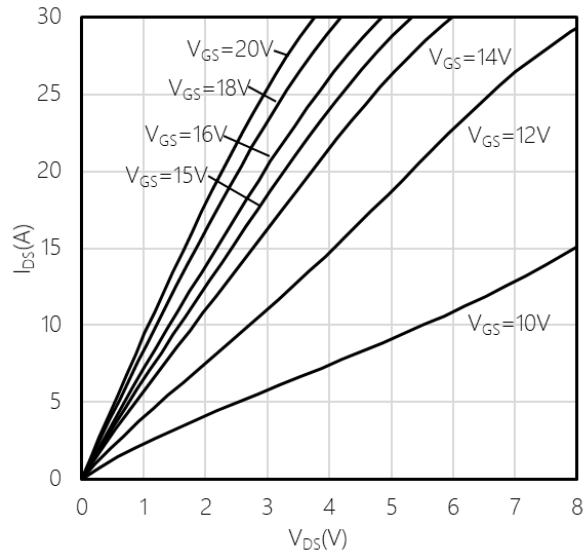


Figure 4: Typical output characteristic, V_{GS} as parameter

$$I_{DS} = f(V_{DS})$$

$$T_{VJ} = 25^{\circ}\text{C}$$

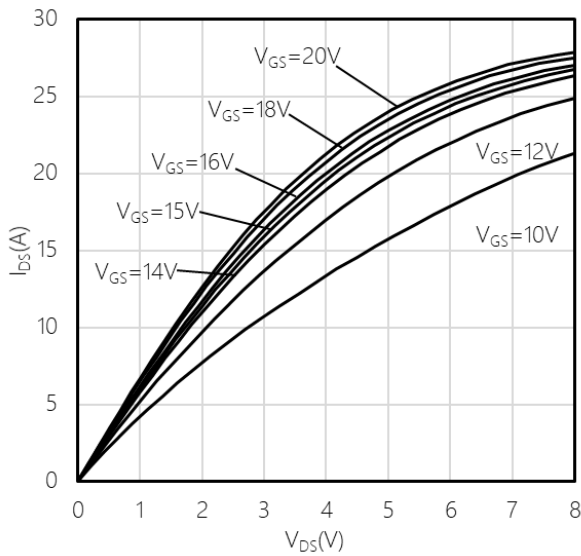


Figure 5 Typical output characteristic, V_{GS} as parameter

$$I_{DS} = f(V_{DS})$$

$$T_{VJ} = 175^{\circ}\text{C}$$

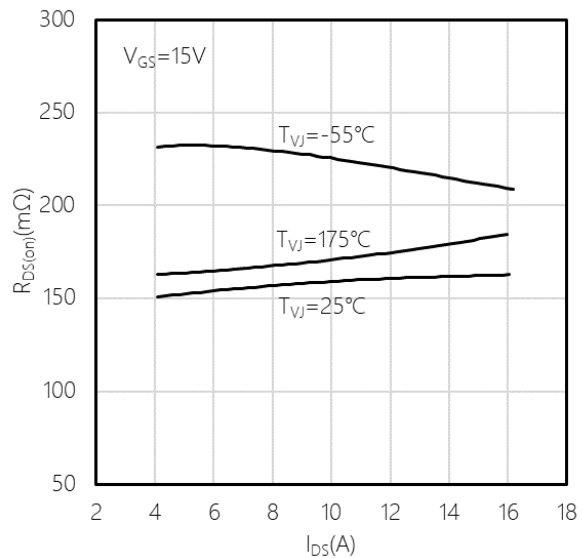


Figure 6: Typical on-state resistance as a function of drain current

$$R_{DS(on)} = f(I_{DS}) \quad V_{GS} = 15\text{V}$$

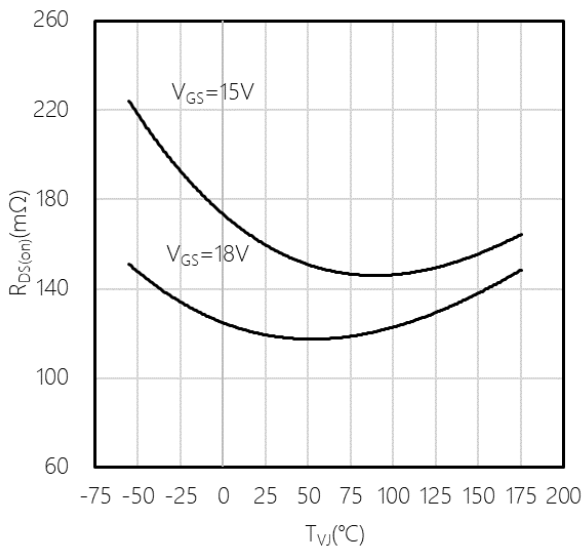


Figure 7: Typical on-state resistance as a function of temperature

$$R_{DS(on)} = f(T_{VJ}), I_{DS} = 10 \text{ A}$$

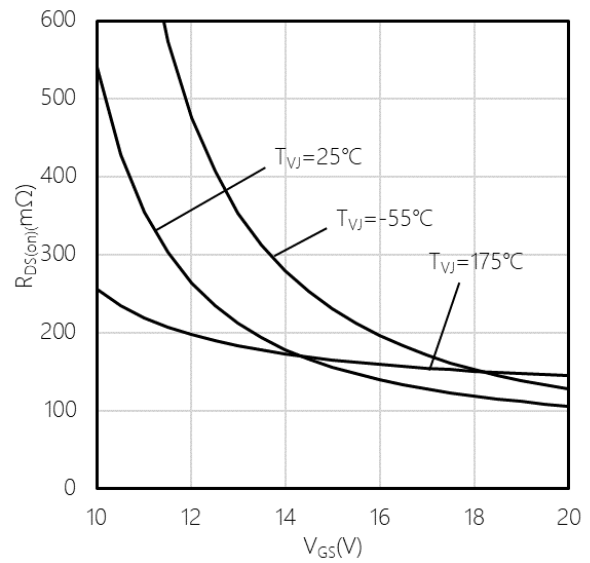


Figure 8: Typical on-state resistance as a function of V_{GS}

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

$$I_{DS} = 10 \text{ A}$$

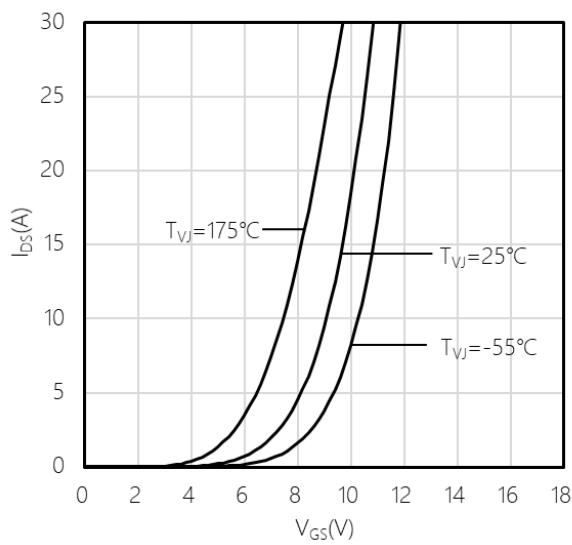


Figure 9: Typical transfer characteristic

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

$$V_{DS} = 20 \text{ V}$$

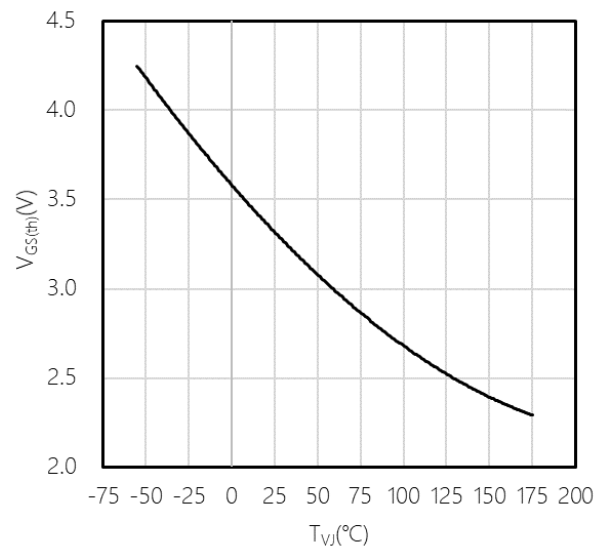


Figure 10: Typical gate-source threshold voltage as a function of junction temperature

$$V_{GS(th)} = f(T_{VJ}), I_{DS} = 3.5 \text{ mA}$$

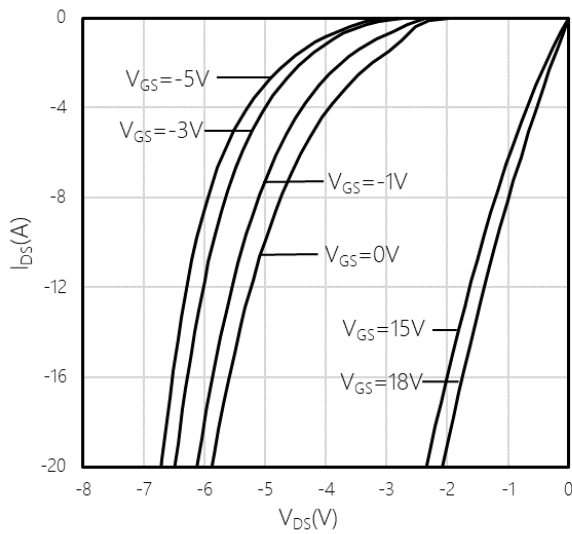


Figure.11: Typical reverse drain current as function of reverse drain voltage, V_{GS} as parameter
 $I_{DS} = f(V_{DS}), T_{VJ} = -55^{\circ}\text{C}$

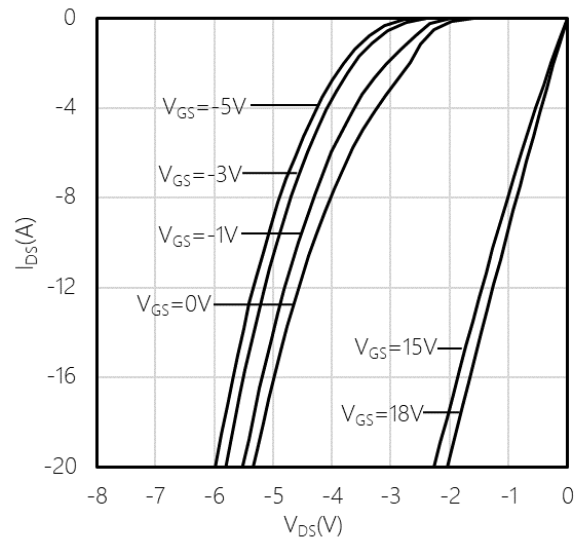


Figure 12 Typical reverse drain current as function of reverse drain voltage, V_{GS} as parameter
 $I_{DS} = f(V_{DS}), T_{VJ} = 25^{\circ}\text{C}$

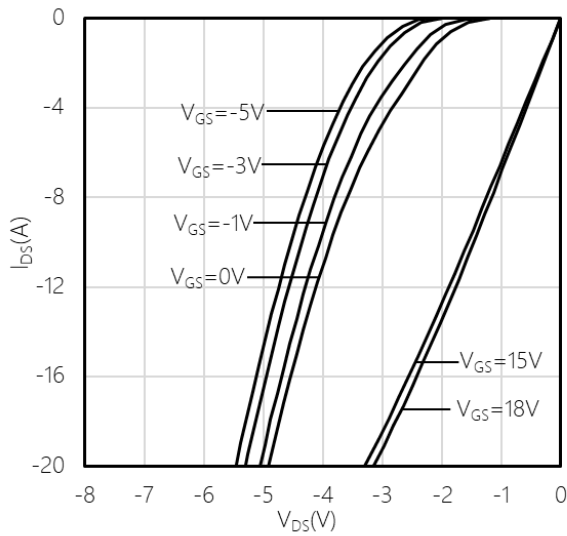


Figure 13 Typical reverse drain current as function of reverse drain voltage, V_{GS} as parameter
 $I_{DS} = f(V_{DS}), T_{VJ} = 175^{\circ}\text{C}$

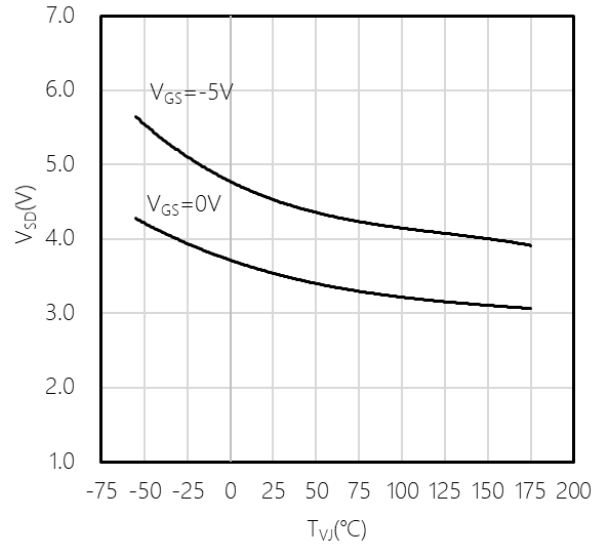


Figure 14 Typical reverse drain voltage as function of junction temperature
 $V_{SD} = f(T_{VJ}), I_{SD} = 5\text{ A}$

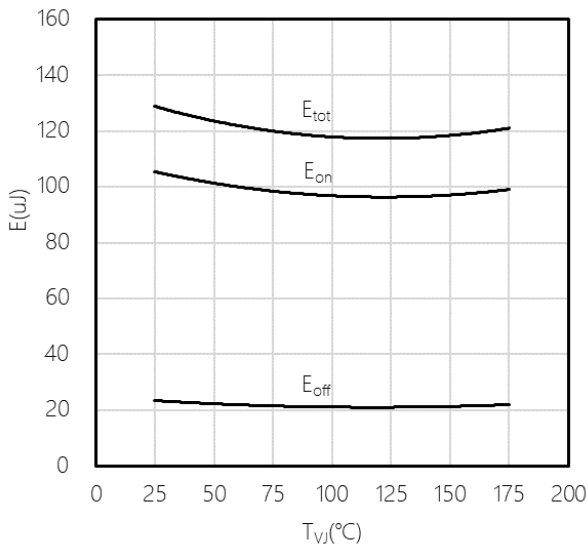


Figure 15 Typical switching energy as a function of junction temperature, 2nd device own body diode: $V_{GS} = -5$ V
 $E = f(T_{VJ})$
 $V_{DS} = 400$ V, $R_{G(ext)} = 2.2$ Ω, $V_{GS} = 0$ V / 15 V, $I_{DS} = 10$ A

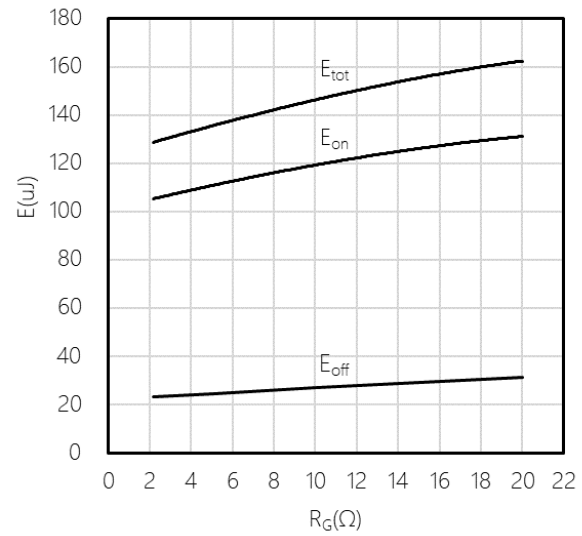


Figure 16 Typical switching energy losses as a function of gate resistance, 2nd device own body diode: $V_{GS} = -5$ V
 $E = f(R_{G(ext)})$
 $V_{GS} = 0/15$ V, $I_{DS} = 10$ A, $T_{VJ} = 25$ °C, $V_{DS} = 400$ V

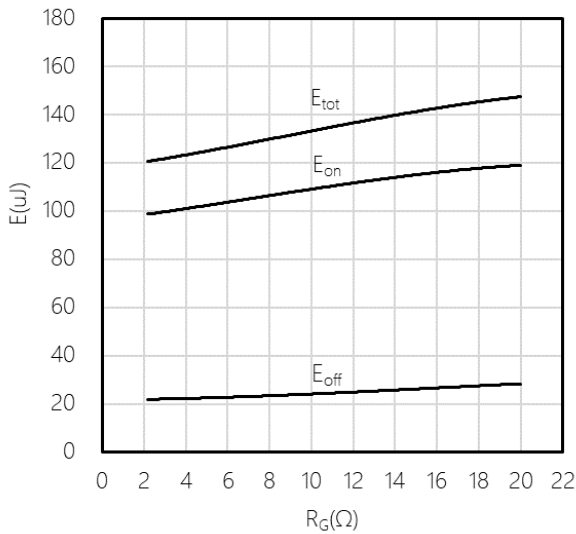


Figure 17 Typical switching energy losses as a function of gate resistance, 2nd device own body diode: $V_{GS} = -5$ V
 $E = f(R_{G(ext)})$
 $V_{GS} = 0/15$ V, $I_{DS} = 10$ A, $T_{VJ} = 175$ °C, $V_{DS} = 400$ V

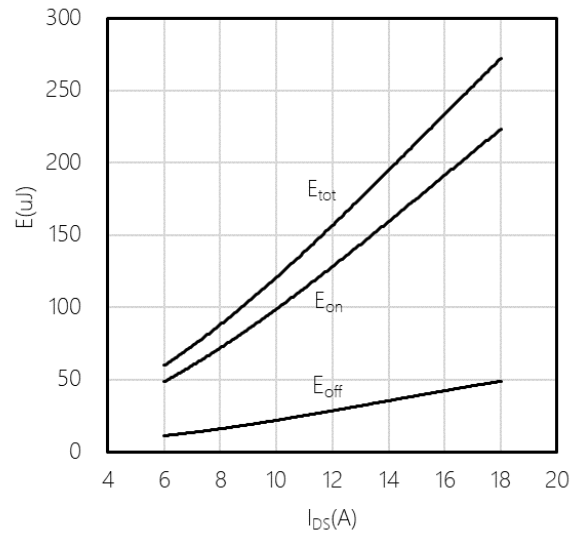


Figure 18 Typical switching energy losses as a function of I_{DS} , 2nd device own body diode: $V_{GS} = -5$ V
 $E = f(I_{DS})$
 $V_{GS} = 0/15$ V, $R_{G(ext)} = 2.2$ Ω, $T_{VJ} = 25$ °C, $V_{DS} = 400$ V

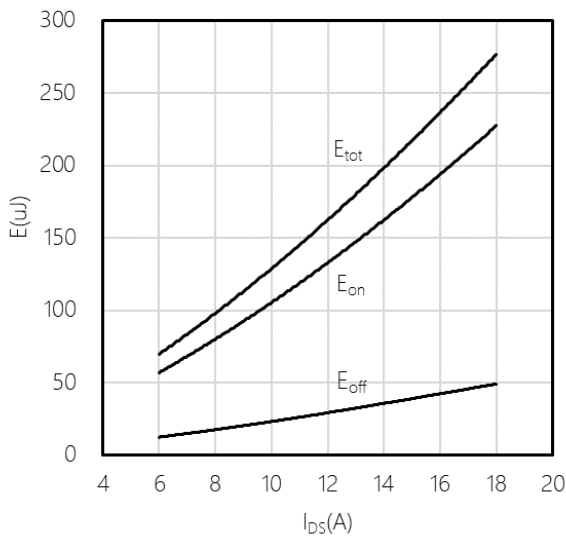


Figure 19 Typical switching energy losses as a function of I_{DS} , 2nd device own body diode: $V_{GS} = -5$ V

$$E = f(I_{DS})$$

$$V_{GS} = 0/15 \text{ V}, R_{G(ext)} = 2.2 \text{ } \Omega, T_{VJ} = 175 \text{ } ^\circ\text{C}, V_{DS} = 400 \text{ V}$$

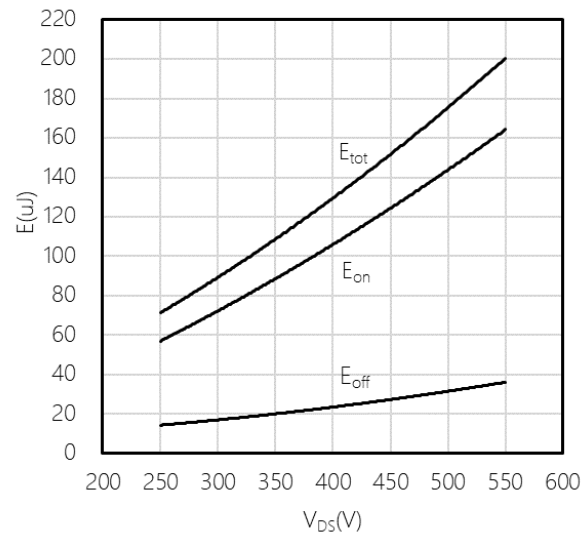


Figure 20 Typical switching energy losses as a function of V_{DS} , 2nd device own body diode: $V_{GS} = -5$ V

$$E = f(V_{DS})$$

$$V_{GS} = 0/15 \text{ V}, R_{G(ext)} = 2.2 \text{ } \Omega, T_{VJ} = 25 \text{ } ^\circ\text{C}, I_{DS} = 10 \text{ A}$$

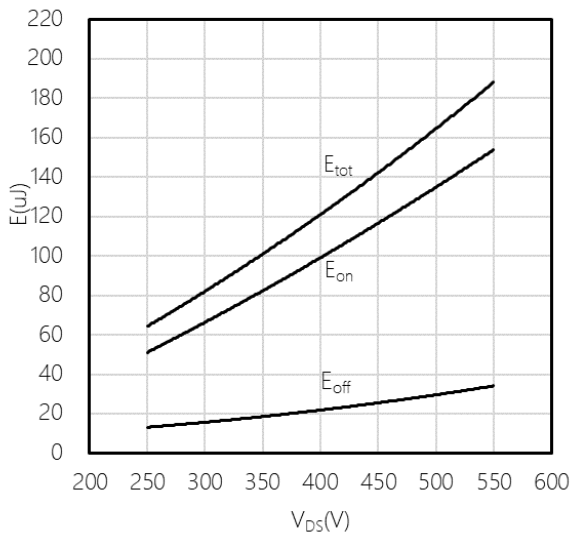


Figure 21 Typical switching energy losses as a function of V_{DS} , 2nd device own body diode: $V_{GS} = -5$ V

$$E = f(V_{DS})$$

$$V_{GS} = 0/15 \text{ V}, R_{G(ext)} = 2.2 \text{ } \Omega, T_{VJ} = 175 \text{ } ^\circ\text{C}, I_{DS} = 10 \text{ A}$$

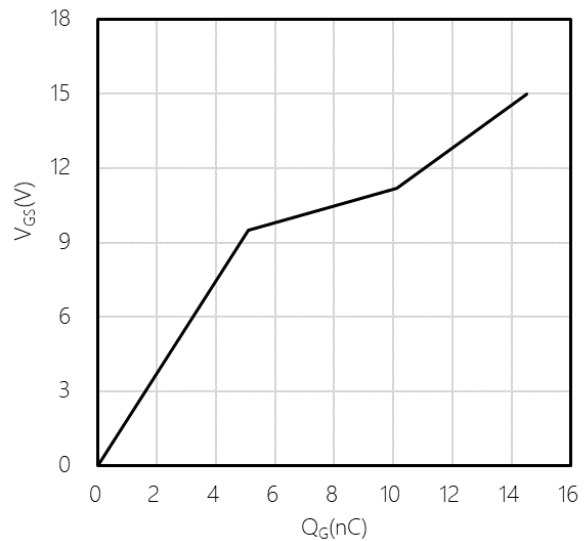


Figure 22 Typical gate charge

$$V_{GS} = f(Q_G), I_{DS} = 10 \text{ A}, V_{DS} = 400 \text{ V}$$

turn-on pulse

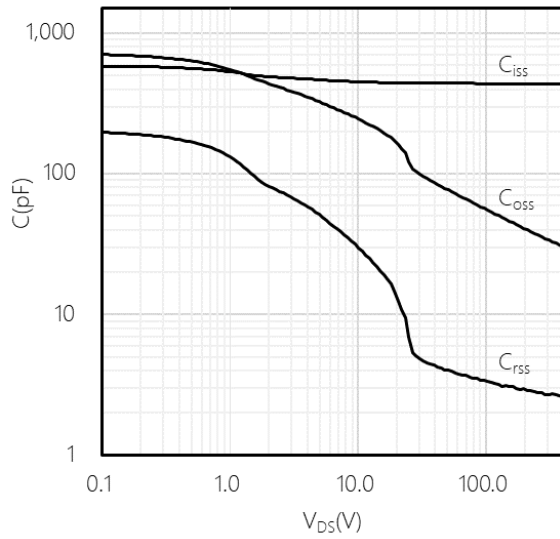


Figure 23 Typical capacitance as a function of drain-source voltage

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

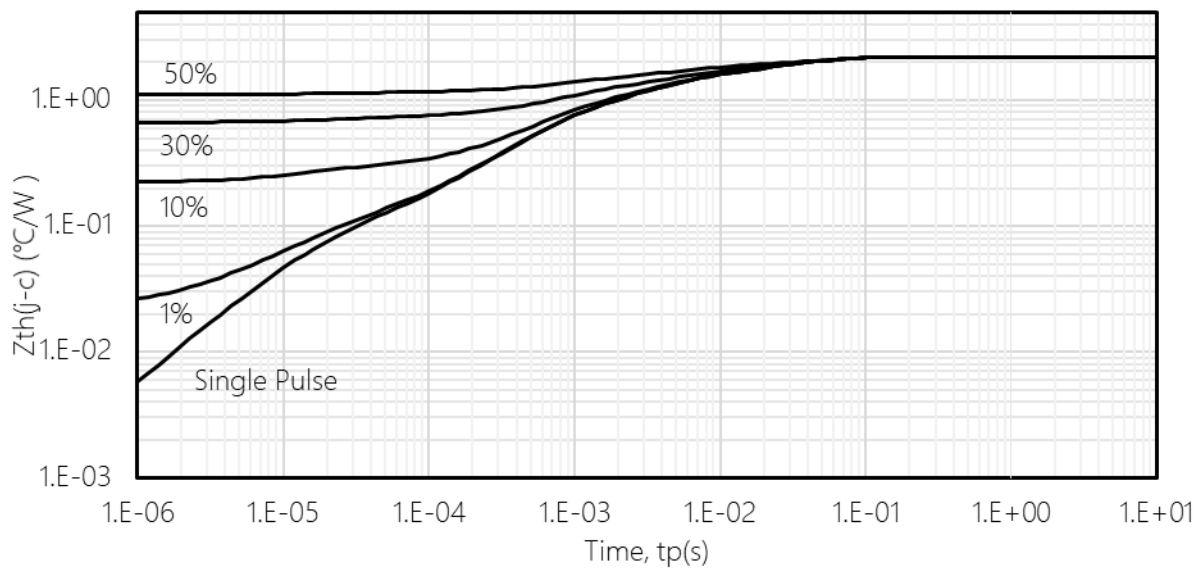
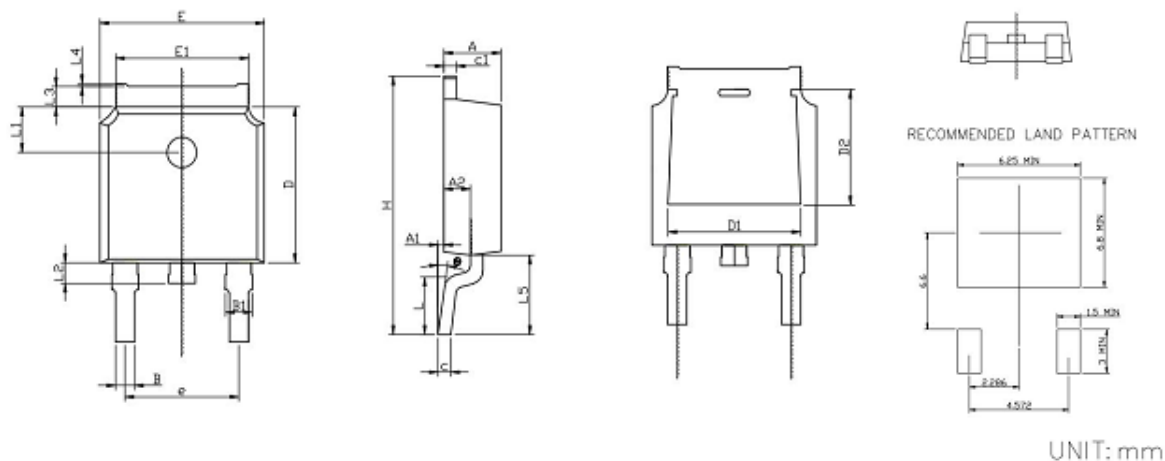


Figure 24 Transient thermal resistance (MOSFET)

$$(Z_{th(j-c,max)}) = f(t_p), \text{Parameter } D = t_p/T$$

Package Outline: TO-252



SYMBOL	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.15	2.45	0.085	0.096
A1	0.05	0.20	0.002	0.008
A2	0.91	1.22	0.036	0.048
B	0.66	0.86	0.026	0.034
B1	0.93	1.23	0.037	0.048
C	0.40	0.60	0.016	0.024
C1	0.40	0.60	0.016	0.024
D	5.95	6.25	0.234	0.246
D1	4.80		0.189	
D2	3.80		0.150	
E	6.45	6.75	0.254	0.266
E1	5.12	5.52	0.202	0.217
L	1.65		0.065	
L1	1.58	1.98	0.062	0.078
L2	0.60	1.00	0.024	0.039
L3	0.70	1.00	0.028	0.039
L4	0.00	0.20	0.000	0.008
L5	2.80	3.40	0.110	0.134
H	9.80	10.40	0.386	0.409
θ	0.00	8.00	0.000	0.315
e	4.57		0.180	

Marking Information:

①. Doingter LOGO

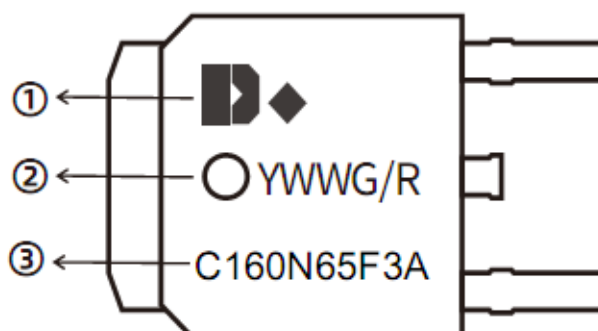
②. Date Code(YWWG / R)

Y : Year Code , last digit of the year

WW : Week Code(01-53)

G/R : G(Green) /R(Lead Free)

③. Part NO.



Previous Version

Version	Date	Subjects (major changes since last revision)
1.0	2026-04-29	Release of final version

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