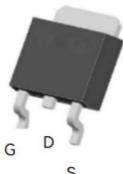
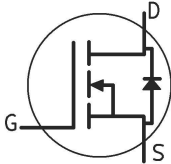


Features

- 650V, 10A, $R_{DS(on)}$ (typ.) = 340mΩ@V_{GS} = 15V.
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitance
- Easy to Parallel and Simple to Drive
- Avalanche Ruggedness
- Resistant to Latch-Up
- RoHS Compliant and Halogen-Free

Application

- Switch Mode Power Supplies
- High Voltage DC/DC Converters
- Uninterruptable Power Supplies
- EV Battery Chargers

TO-252 (TOP view)	Equivalent Schematic
	

Absolute Maximum Ratings (T_c = 25° C unless otherwise noted)

Symbol	Parameter	Test conditions	Value	Unit
V _{DSmax}	Drain-Source Voltage	V _{GS} =0V, I _D =100μA	650	V
V _{GSmax}	Gate-Source Voltage	Absolute Maximum Values	-10/+22	V
V _{GSop}	Gate-Source Voltage	Recommended Operational Values	0/+15	V
I _D	Drain Current-Continuous	V _{GS} =15V, T _C = 25°C	10	A
	Drain Current-Continuous	V _{GS} =15V, T _C = 100°C	8.5	A
I _{DM}	Drain Current-Pulsed	Pulse Width tp Limited by T _{Jmax}	18	A
P _D	Maximum power Dissipation	T _C = 25°C, T _J = 175°C	57	W
T _J	Operating Temperature Junction		-55 to +175	°C
T _S	Storage Temperature		-55 to +175	°C
T _{SOLD}	Soldering Peak Temperature		260	°C

Thermal Characteristics

Symbol	Parameter	Typical	Unit
R _{θJC}	Thermal Resistance Junction-Case	2.6	°C/W
R _{θJA}	Thermal Resistance Junction-Ambient	62	°C/W

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

■ Off Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 100\mu A$	650	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 650V$ $T_J = 25^\circ\text{C}$	-	0.1	20	μA
		$V_{GS} = 0V, V_{DS} = 650V$ $T_J = 175^\circ\text{C}$	-	1.0	-	μA
I_{GSS}	Gate-Source Leakage Current	$V_{DS} = 0V, V_{GS} = 22V$	-	-	250	nA
		$V_{DS} = 0V, V_{GS} = -10V$	-250	-	-	nA

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 3.5mA$ $T_J = 25^\circ\text{C}$	2.7	3.5	5.0	V
		$V_{DS} = V_{GS}, I_D = 3.5mA$ $T_J = 175^\circ\text{C}$	-	2.5	-	V
$R_{DS(on)}$	Gate-Source On Resistance	$V_{GS} = 15V, I_D = 5A$ $T_J = 25^\circ\text{C}$	-	340	380	m Ω
		$V_{GS} = 15V, I_D = 5A$ $T_J = 175^\circ\text{C}$	-	321	-	
g_{fs}	Trans Conductance	$V_{DS} = 20V, I_{DS} = 5A$ $T_J = 25^\circ\text{C}$	-	3.5	-	S
		$V_{DS} = 20V, I_{DS} = 5A$ $T_J = 175^\circ\text{C}$	-	3.3	-	S

■ Dynamic Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$R_{G(int)}$	Internal Gate Resistance	$f=1MHz, V_{AC}=25mV$	-	26	-	Ω
C_{iss}	Input Capacitance	$V_{GS} = 0V,$ $V_{DS} = 400V$ $f=1MHz$	-	228	-	pF
C_{oss}	Output Capacitance		-	17	-	
C_{rss}	Transfer Capacitance		-	1.4	-	
Q_G	Total Gate Charge	$V_{GS} = 0\sim 15V,$ $V_{DS} = 400V,$ $I_D = 5A$	-	8.8	-	nC
Q_{GS}	Gate-Source Charge		-	3.3	-	
Q_{GD}	Gate-Drain Charge		-	1.2	-	

Dynamic Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
E_{ON}	Turn-On Switching Energy	$V_{GS} = 0 \sim 15 \text{ V}$, $V_{DS} = 400 \text{ V}$, $I_D = 5 \text{ A}$, $R_{G(ext)} = 4.3 \Omega$, $L = 600 \mu\text{H}$, $T_J = 25^\circ\text{C}$	-	47.6	-	μJ
E_{OFF}	Turn-Off Switching Energy		-	4.0	-	
E_{tot}	Total Switching Energy		-	51.6	-	
$t_{d(on)}$	Turn-On Delay Time		-	16.5	-	ns
t_r	Turn-On Rise Time		-	11.3	-	
$t_{d(off)}$	Turn-Off Delay Time		-	21.2	-	
t_f	Turn-Off Fall Time		-	12.7	-	
E_{ON}	Turn-On Switching Energy	$V_{GS} = 0 \sim 15 \text{ V}$, $V_{DS} = 400 \text{ V}$, $I_D = 5 \text{ A}$, $R_{G(ext)} = 4.3 \Omega$, $L = 600 \mu\text{H}$, $T_J = 175^\circ\text{C}$	-	45.1	-	μJ
E_{OFF}	Turn-Off Switching Energy		-	3.8	-	
E_{tot}	Total Switching Energy		-	48.9	-	
$t_{d(on)}$	Turn-On Delay Time		-	14.9	-	ns
t_r	Turn-On Rise Time		-	9.5	-	
$t_{d(off)}$	Turn-Off Delay Time		-	23.9	-	
t_f	Turn-Off Fall Time		-	12.5	-	

Reverse Diode Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_{SD}	Reverse Voltage	$V_{GS} = 0 \text{ V}$, $I_{SD} = 2.5 \text{ A}$ $T_J = 25^\circ\text{C}$	-	3.5	-	V
		$V_{GS} = 0 \text{ V}$, $I_{SD} = 2.5 \text{ A}$ $T_J = 175^\circ\text{C}$	-	3.0	-	V
I_S	Continuous Diode Forward Current	$V_{GS} = 0 \text{ V}$, $T_C = 25^\circ\text{C}$	-	9.7	-	A
t_{rr}	Reverse Recovery Time	$V_{GS} = 0 \text{ V}$, $I_{SD} = 5 \text{ A}$, $V_R = 400 \text{ V}$, $di/dt = 1600 \text{ A}/\mu\text{s}$, $T_C = 25^\circ\text{C}$	-	10.9	-	ns
Q_{rr}	Reverse Recovery Charge		-	28	-	nC
I_{rrm}	Reverse Recovery Current		-	3.9	-	A
E_{rr}	Reverse Recovery Energy		-	0.22	-	μJ

Notes:

- In off-state, spike duty cycle $D < 0.01$, spike duration $< 1 \mu\text{s}$.
- For increased stability at high current operation.
- Reflow MSL3.

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

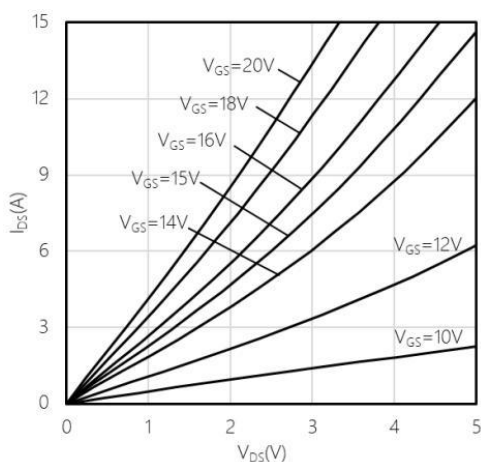


Figure 1. Typical Output Characteristics $T_J = -55^\circ\text{C}$

Parameter: V_{GS}

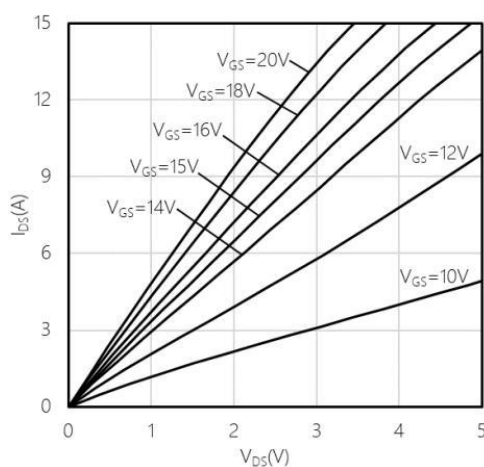


Figure 2. Typical Output Characteristics $T_J = 25^\circ\text{C}$

Parameter: V_{GS}

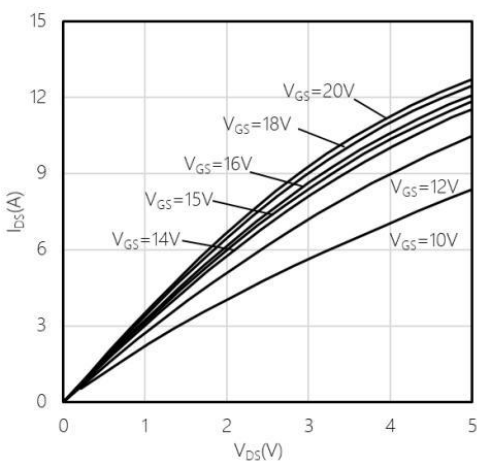


Figure 3. Typical Output Characteristics $T_J = 175^\circ\text{C}$

Parameter: V_{GS}

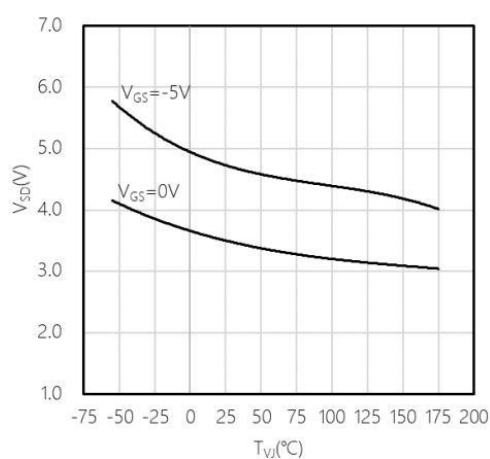


Figure 4. Typical Reverse Drain Voltage as Function of Junction Temperature ($I_{SD}=2.5\text{A}$)

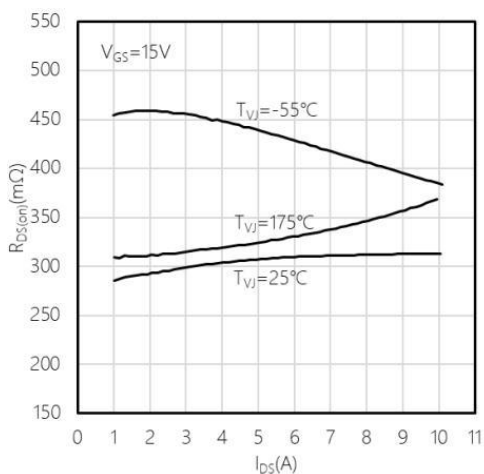


Figure 5. Typical on-state Resistance as a Function Of Drain Current ($V_{GS}=15\text{V}$)

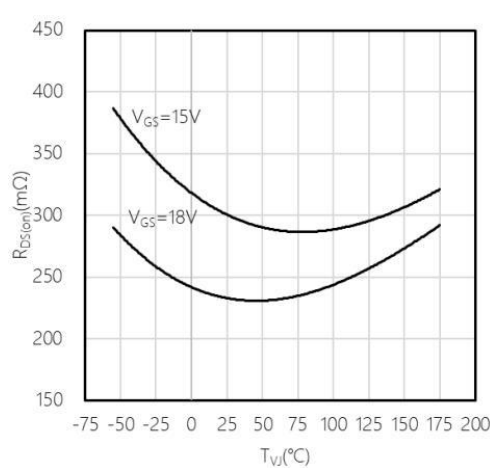


Figure 6. Typical on-state Resistance as a Function of Temperature ($I_{DS}=5\text{A}$)

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

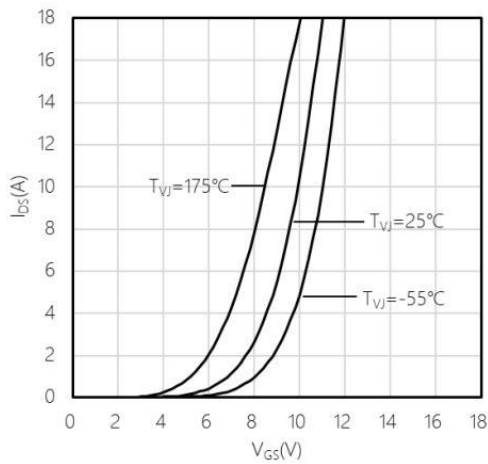


Figure 7. Typical Transfer Characteristic ($V_{DS}=20\text{V}$)

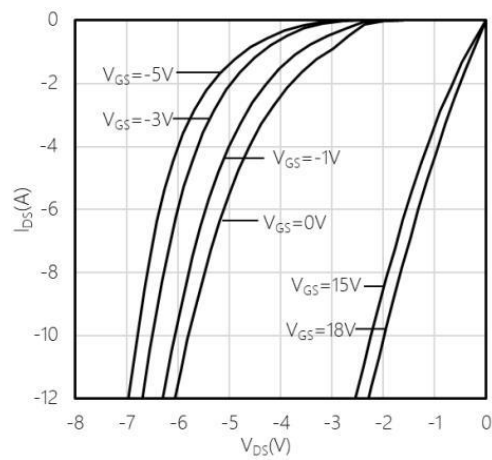


Figure 8. Typical Reverse Drain Current as Function of Reverse Drain Voltage, V_{GS} as Parameter ($T_{VJ}=-55^\circ\text{C}$)

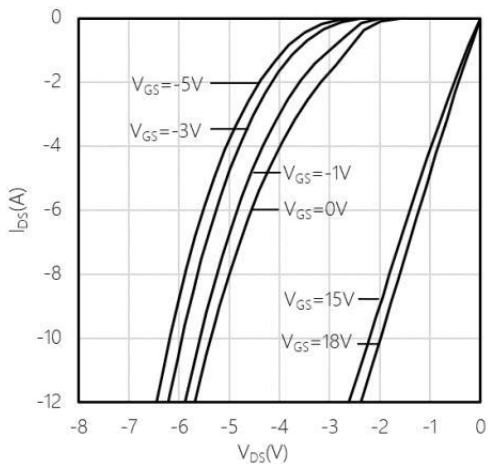


Figure 9. Typical Reverse Drain Current as Function of Reverse Drain Voltage, V_{GS} as Parameter ($T_{VJ}=25^\circ\text{C}$)

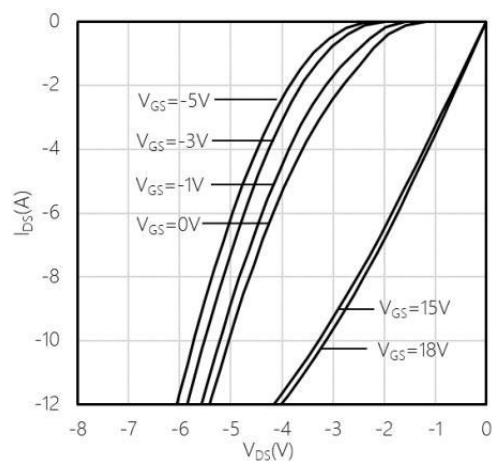


Figure 10. Typical Reverse Drain Current as Function of Reverse Drain Voltage, V_{GS} as Parameter ($T_{VJ}=175^\circ\text{C}$)

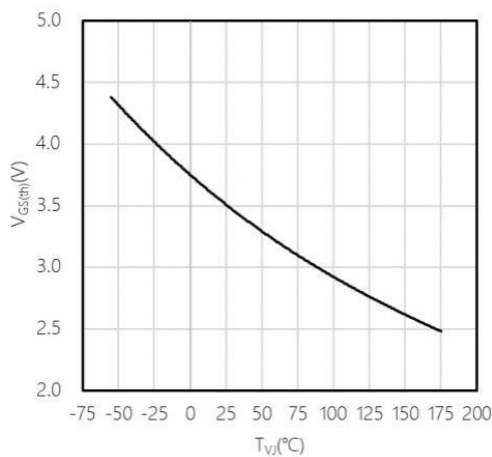


Figure 11. Threshold Voltage vs Temperature

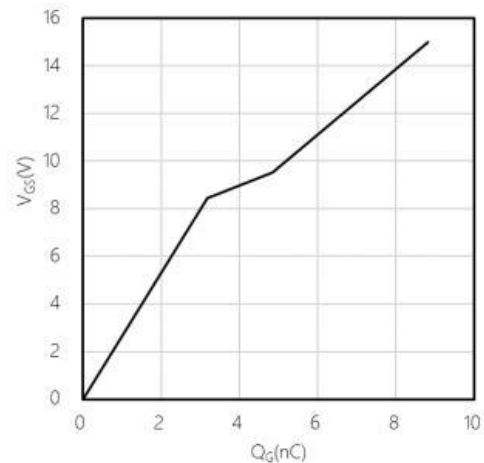
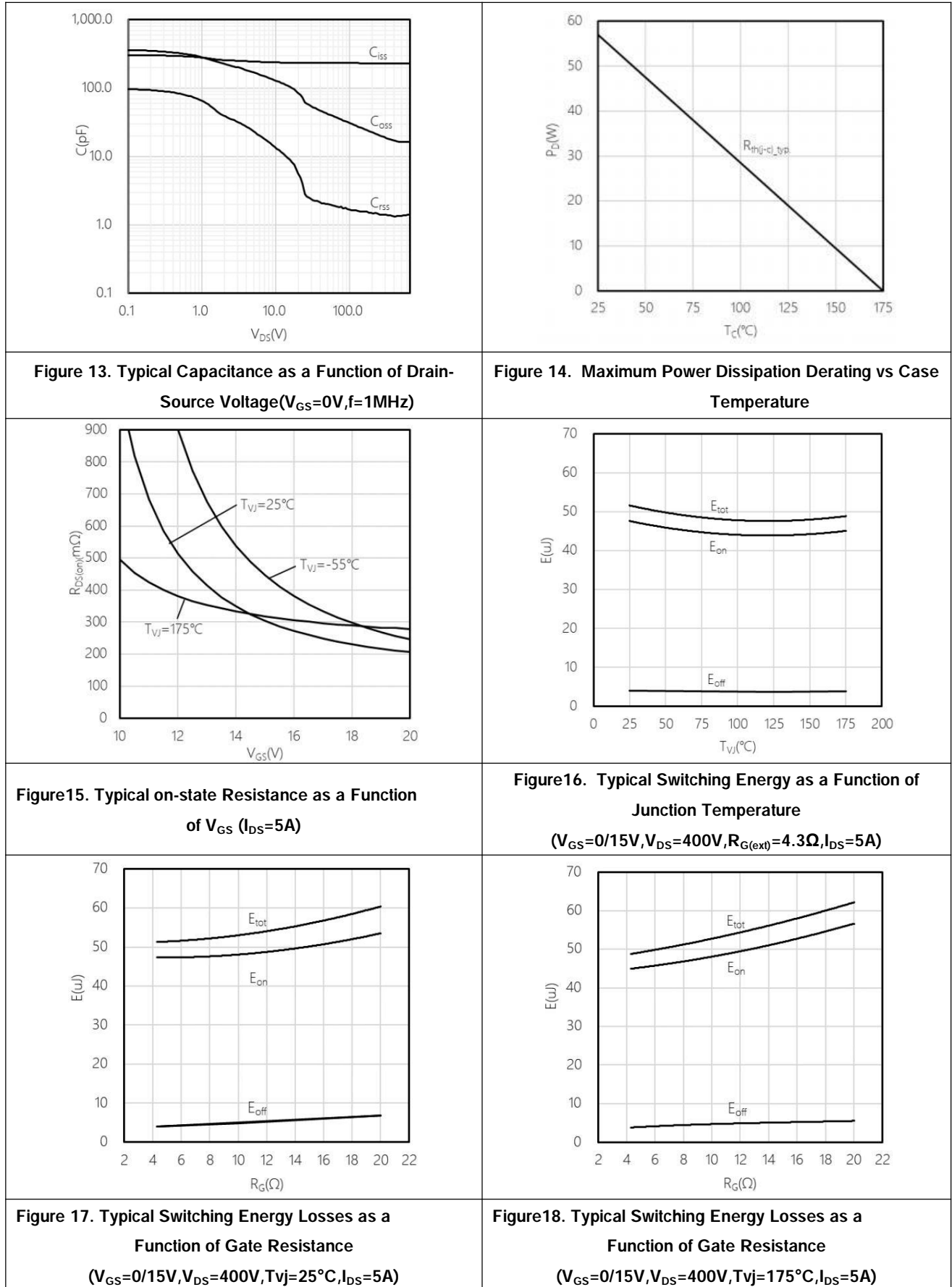


Figure 12. Gate Charge Characteristics

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



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

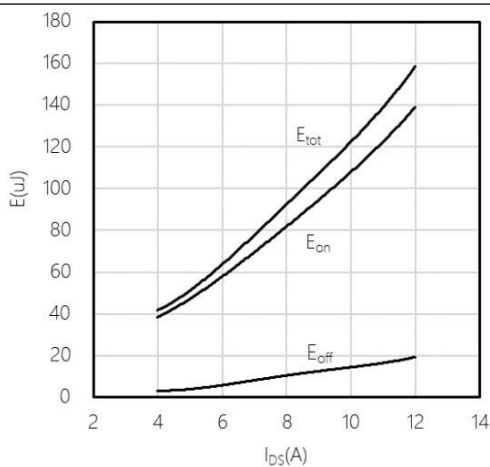


Figure 19. Typical Switching Energy Losses as a Function of I_{DS}

($V_{GS}=0/15V, V_{DS}=400V, R_{G(ext)}=4.3\Omega, T_{vj}=25^\circ\text{C}$)

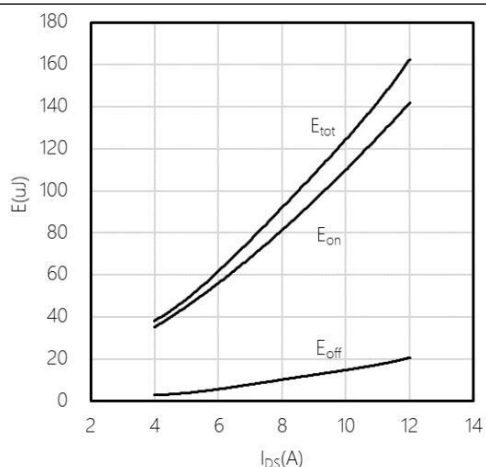


Figure 20. Typical Switching Energy Losses as a Function of I_{DS}

($V_{GS}=0/15V, V_{DS}=400V, R_{G(ext)}=4.3\Omega, T_{vj}=175^\circ\text{C}$)

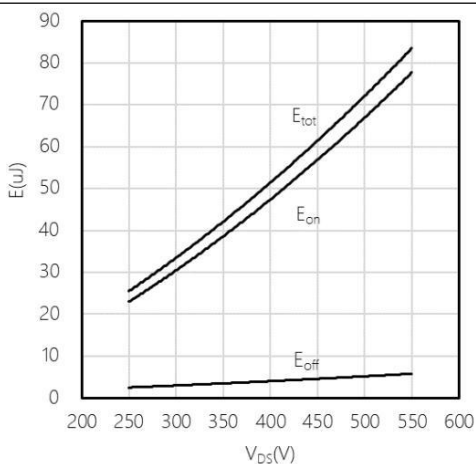


Figure 21. Typical switching energy losses as a function of V_{DS}

($V_{GS}=0/15V, T_{vj}=25^\circ\text{C}, R_{G(ext)}=4.3\Omega, I_{DS}=5A$)

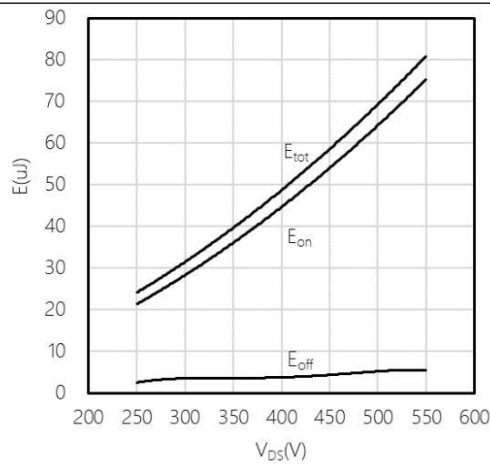


Figure 22. Typical switching energy losses as a function of V_{DS}

($V_{GS}=0/15V, T_{vj}=175^\circ\text{C}, R_{G(ext)}=4.3\Omega, I_{DS}=5A$)

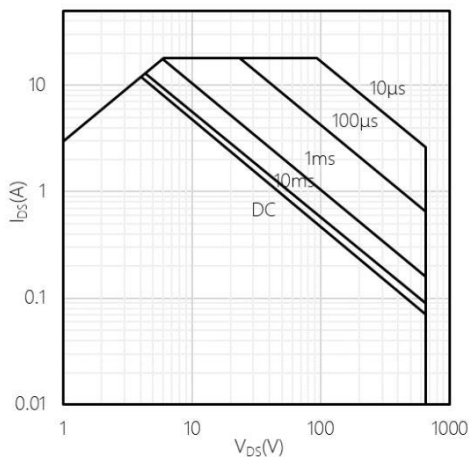


Figure 23. Safe Operating Area

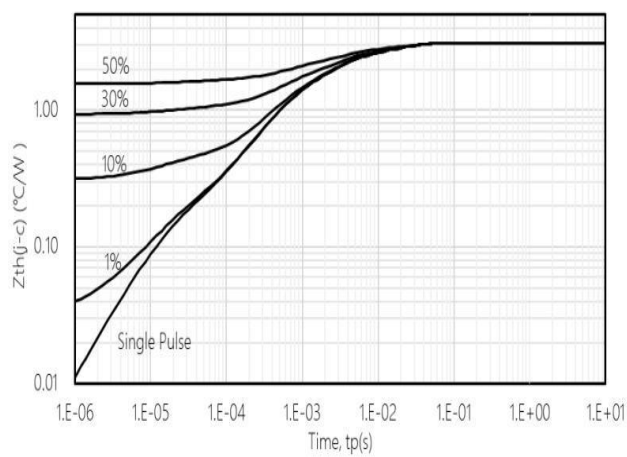
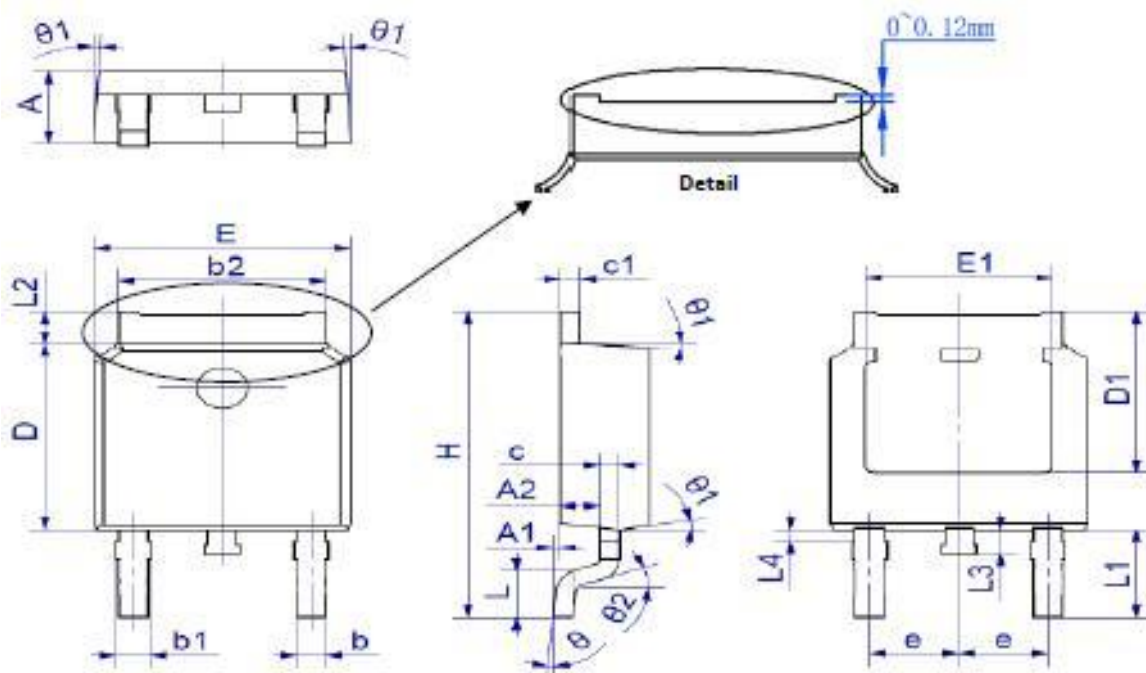


Figure 24. Transient Thermal Impedance(MOSFET)

■ TO-252 Package Information

TO-252-3L



UNIT:mm

Type	Millimeters		
	Min	Nom	Max
A	2.10	-	2.50
A1	0	-	0.15
A2	0.76	-	1.36
b	0.61	-	0.85
b1	0.71	-	0.91
b2	5.04	-	5.64
c	0.508 TYP.		
c1	0.508 TYP.		
D	5.8	-	6.3
D1	5.0	-	5.6
E	6.3	-	6.9
E1	4.55	-	5.15
e	2.286 TYP.		
H	9.65	-	10.4
L	1.4	-	1.7
L1	2.90 REF.		
L2	0.75	-	1.35
L3	0.6	-	1.2
θ	0°	-	10°
θ1	5°	-	9°
θ2		25° REF.	



MCD340N65H3

650V SiC Power MOSFET

■ Revision History

Version	Date	Subjects (major changes since last revision)
1.0	2026-06-26	Datasheet Complete