

ASR30N1200MD04X

1200V, 75A, 30mΩ, N-Channel, Silicon Carbide MOSFET

Product Data Sheet

ASTC-3T04-100A A/0



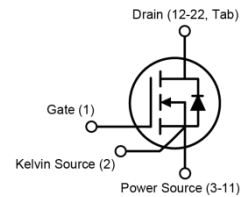
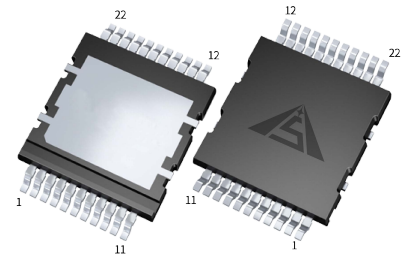
爱仕特科技
AST TECHNOLOGY

General Description

The AST-MD04 series SiC MOSFET in QDPAK package ensures stable high-temperature operation for power-dense and energy-critical systems, enabling compact designs with reduced EMI.

Features

- High Speed Switching with Low Capacitances
- High Blocking Voltage with Low $R_{DS(on)}$
- Low Impedance Package with Driver Source Pin
- Easy to Parallel and Simple to Drive
- RoHS Compliant, Halogen Free
- For Topside Cooling Application



Applications

- EV Charging
- High Voltage DC/DC Converters
- Switch Mode Power Supplies
- Power Factor Correction Modules

Ordering Informations

Order Number	ASR30N1200MD04X
Marking	ASR30N1200MD04
Package Type	QDPAK
Packing Method	Reel

Key Parameters

Symbol	Parameter	Values			Unit	Test Conditions
Absolute maximum rating						
V _{DS}	Drain-Source Voltage	1200			V	T _C =25°C
I _D	Drain Current (continuous)	75			A	T _C =25°C
P _D	Power Dissipation	312			W	T _C =25°C
T _J	Junction Temperature	-55 to +175			°C	
Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
Static characteristics						
R _{DS(on)}	Static Drain-Source on Resistance	-	36	43	mΩ	V _{GS} =15V; I _D =33A; T _J =25°C
		-	30	36		V _{GS} =18V; I _D =33A; T _J =25°C
Dynamic characteristics						
Q _G	Total Gate Charge	-	72	-	nC	V _{DS} =800V; V _{GS} =-5V/18V; I _D =33A; T _J =25°C
Q _{GD}	Gate-Drain Charge	-	19	-		
Source-Drain diode						
Q _{rr}	Reverse Recovery Charge	-	325	-	nC	V _{GS} =-5V; I _F =33A; V _R =800V; di/dt=2600A/μs; T _J =175°C

Absolute Maximum Ratings (at $T_c=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Values	Unit
V_{DS}	Drain-Source Voltage	1200	V
I_D	Drain Current (continuous; $T_c=25^\circ\text{C}$)	75	A
	Drain Current (continuous; $T_c=100^\circ\text{C}$)	52	
I_{DM}	Drain Current (pulsed)	200	A
V_{GS}	Gate-Source Voltage	-10/+22	V
P_D	Power Dissipation ($T_c=25^\circ\text{C}$)	312	W
T_J, T_{stg}	Junction and Storage Temperature Range	-55 to +175	$^\circ\text{C}$

MOSFET Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
Static characteristics (at T _J =25°C unless otherwise specified)						
BV _{DS}	Drain-Source Breakdown Voltage	1200	-	-	V	I _D =250μA; V _{GS} =0V
I _{DSS}	Zero Gate Voltage Drain Current	-	5	100	μA	V _{DS} =1200V; V _{GS} =0V
I _{GSS}	Gate-Body Leakage Current	-	10	250	nA	V _{GS} =-10/20V; V _{DS} =0V
V _{GS(th)}	Gate Threshold Voltage	2.2	2.5	3.6	V	V _{DS} =V _{GS} ; I _D =10mA
V _{GS(on)}	Recommended Turn-on Voltage	-	15/18	-	V	Static
V _{GS(off)}	Recommended Turn-off Voltage	-	-5	-		
R _{DS(on)}	Static Drain-Source on Resistance	-	36	43	mΩ	V _{GS} =15V; I _D =33A; T _J =25°C
		-	54	-		V _{GS} =15V; I _D =33A; T _J =175°C
		-	30	36		V _{GS} =18V; I _D =33A; T _J =25°C
		-	45	-		V _{GS} =18V; I _D =33A; T _J =175°C
Dynamic characteristics (at T _J =25°C unless otherwise specified)						
C _{iss}	Input Capacitance	-	2220	-	pF	V _{DS} =1000V; f=1MHz; V _{AC} =25mV
C _{oss}	Output Capacitance	-	105	-		
C _{rss}	Reverse Transfer Capacitance	-	7	-		
g _{fs}	Transconductance	-	23	-	S	V _{DS} =20V; I _D =33A
E _{oss}	Coss Stored Energy	-	48	-	μJ	V _{DS} =1000V; f=1MHz
E _{on}	Turn-on Energy (Body Diode)	-	378	-	μJ	V _{DS} =800V; V _{GS} =-5/18V; I _D =33A; L=100μH; R _{G(ext)} =2.5Ω; T _J =175°C
E _{off}	Turn-off Energy (Body Diode)	-	98	-		
Q _G	Total Gate Charge	-	72	-	nC	V _{DS} =800V; V _{GS} =-5/18V; I _D =33A
Q _{GS}	Gate-Source Charge	-	26	-		
Q _{GD}	Gate-Drain Charge	-	19	-		
R _{G(int)}	Internal Gate Resistance	-	1.2	-	Ω	f=1MHz; V _{AC} =25mV
t _{d(on)}	Turn-on Delay Time	-	17	-	ns	V _{DS} =800V; V _{GS} =-5/18V; I _D =33A; R _{G(ext)} =2.5Ω; Load=100μH
t _r	Rise Time	-	16	-		
t _{d(off)}	Turn-off Delay Time	-	25	-		
t _f	Fall Time	-	9	-		

Body Diode Characteristics (at $T_J=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
V_{SD}	Diode Forward Voltage	-	3.6	6	V	$V_{GS}=0\text{V}; I_F=20\text{A}; T_J=25^{\circ}\text{C}$
		-	3.2	6		$V_{GS}=0\text{V}; I_F=20\text{A}; T_J=175^{\circ}\text{C}$
I_S	Continuous Diode Forward Current	-	68	-	A	$V_{GS}=0\text{V}; T_C=25^{\circ}\text{C}$
T_{rr}	Reverse Recovery Time	-	32	-	ns	$V_{GS}=-5\text{V}; I_F=33\text{A}; V_R=800\text{V};$ $di/dt=2600\text{A}/\mu\text{s}; T_J=175^{\circ}\text{C}$
Q_{rr}	Reverse Recovery Charge	-	325	-	nC	
I_{rrm}	Peak Reverse Recovery Current	-	22	-	A	

Thermal Characteristics

Symbol	Parameter	Value.	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.48	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	40	$^{\circ}\text{C}/\text{W}$

The values are based on Junction-to-Case Thermal Impedance measured with the device mounted to a large heat sink, assuming a maximum junction temperature of $T_{J(max)}=175^{\circ}\text{C}$.

Typical Performance

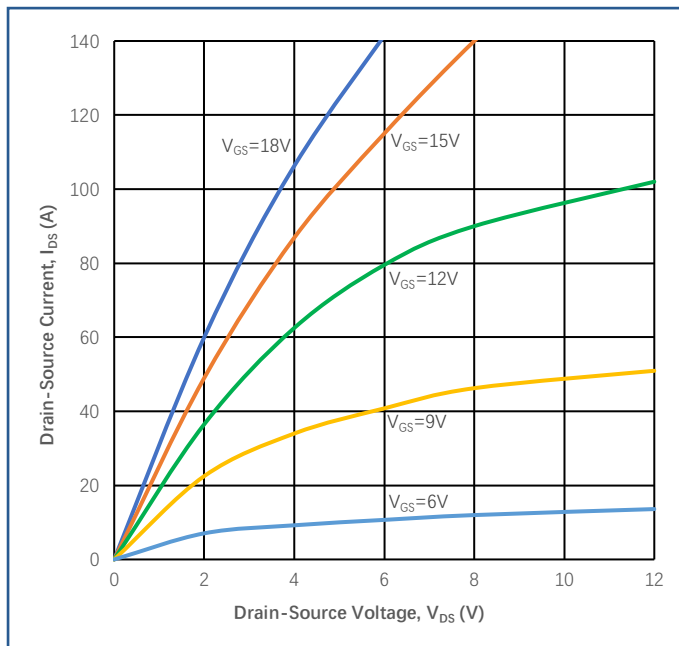


Figure 1
Output Characteristics ($T_J = 25^\circ\text{C}$)

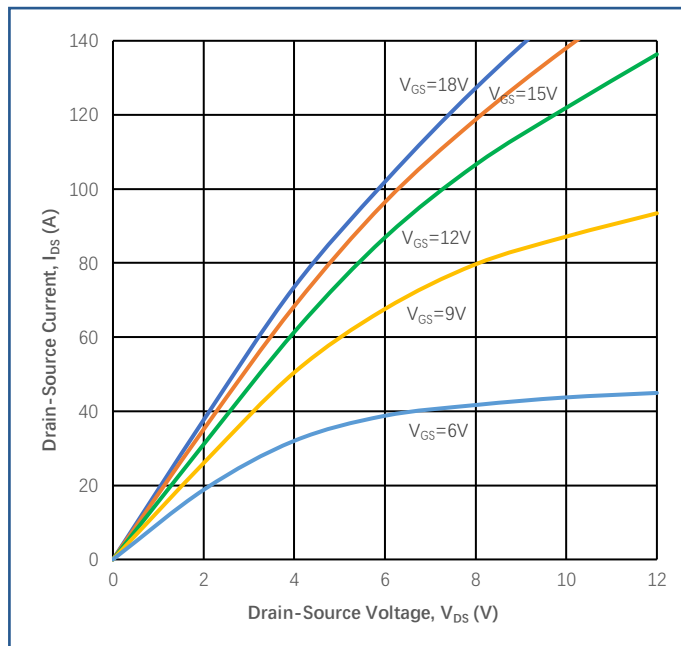


Figure 2
Output Characteristics ($T_J = 175^\circ\text{C}$)

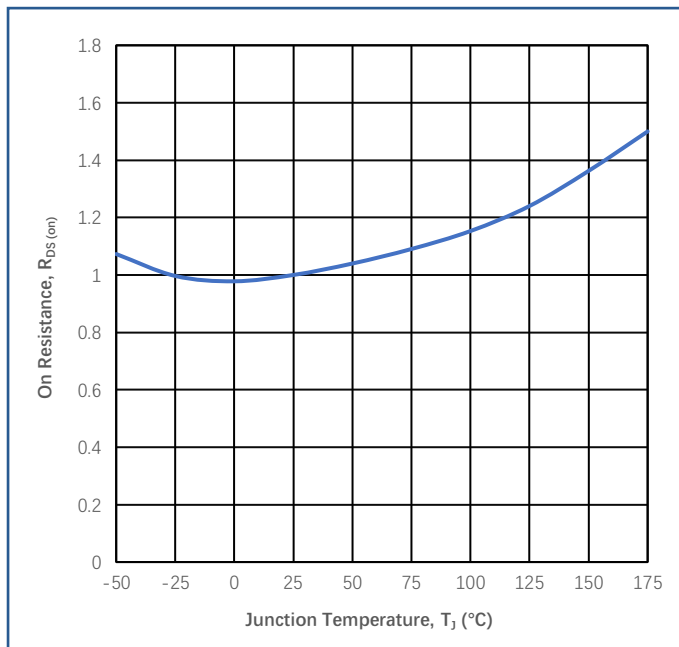


Figure 3
Normalized On-Resistance vs. Temperature

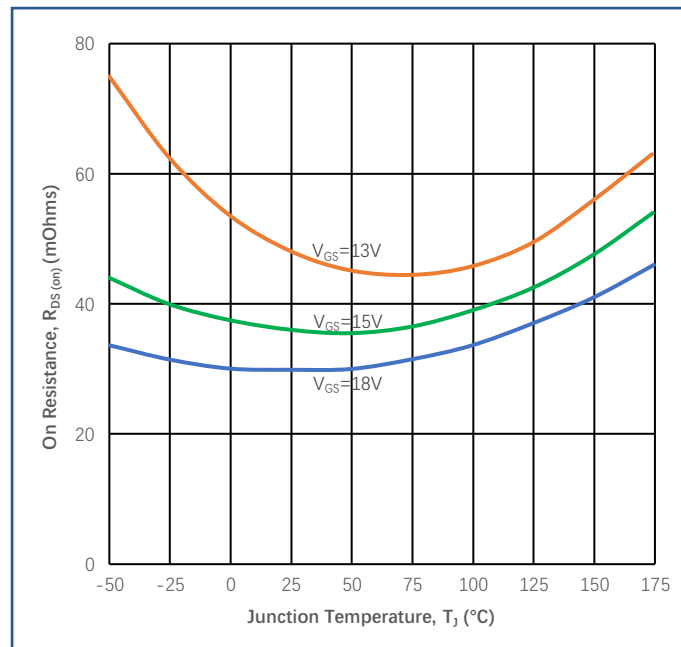


Figure 4
On-Resistance vs. Temperature

Typical Performance

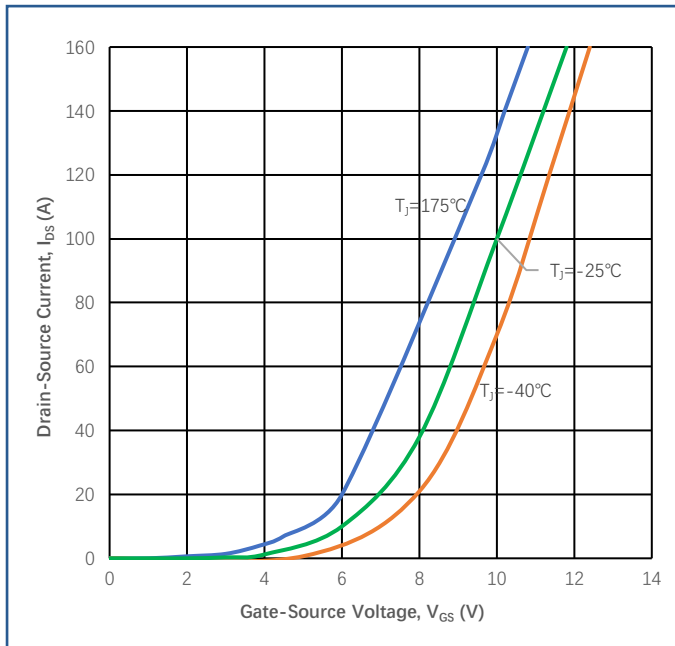


Figure 5
Transfer Characteristic

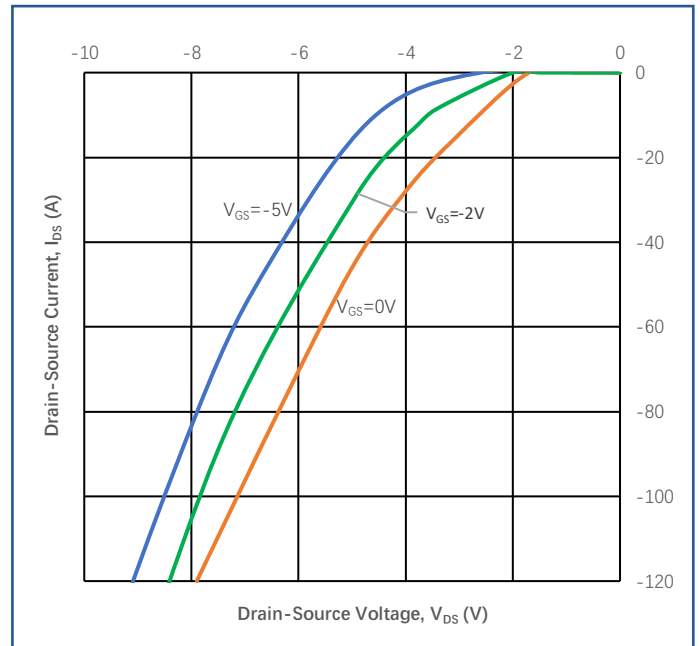


Figure 6
Body Diode Characteristic at 25°C

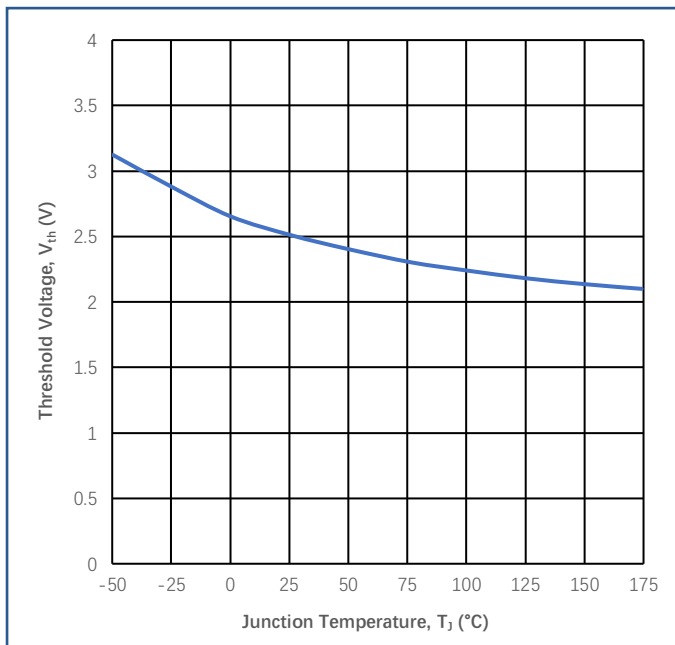


Figure 7
Threshold Voltage vs. Temperature

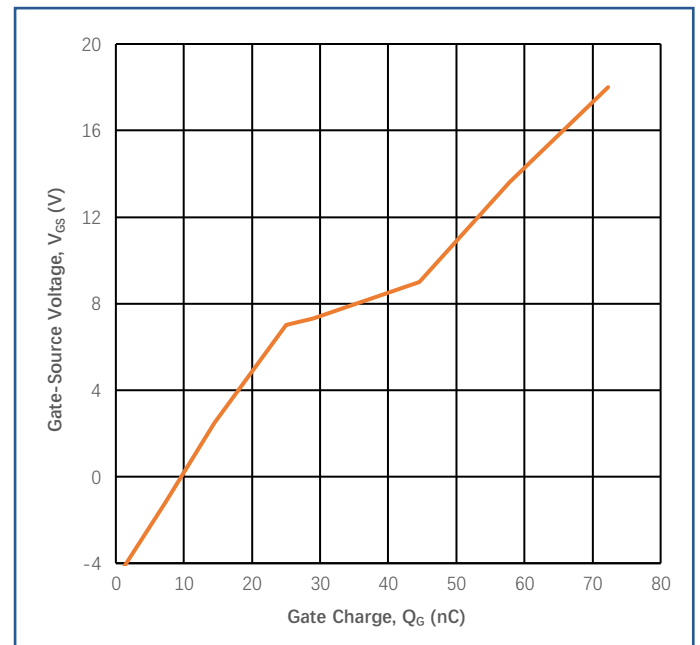


Figure 8
Gate Charge Characteristics

Typical Performance

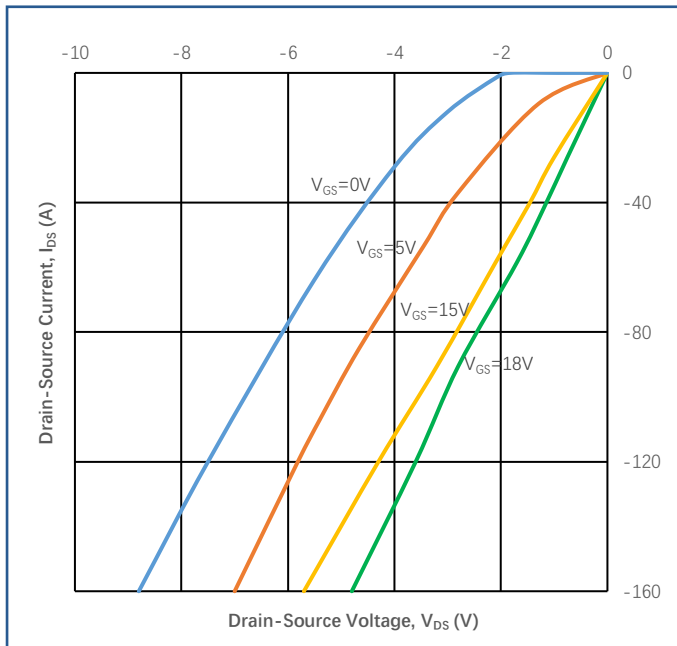


Figure 9
3rd Quadrant Characteristic at 25°C

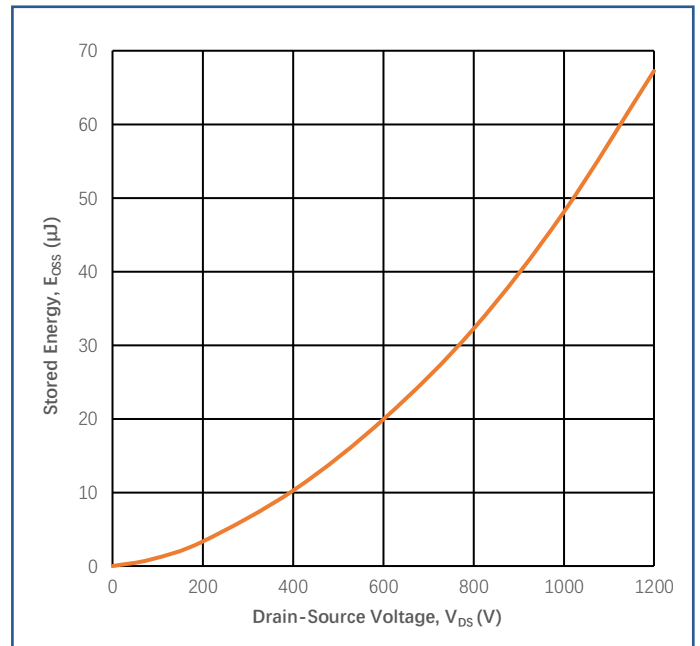


Figure 10
Output Capacitor Stored Energy

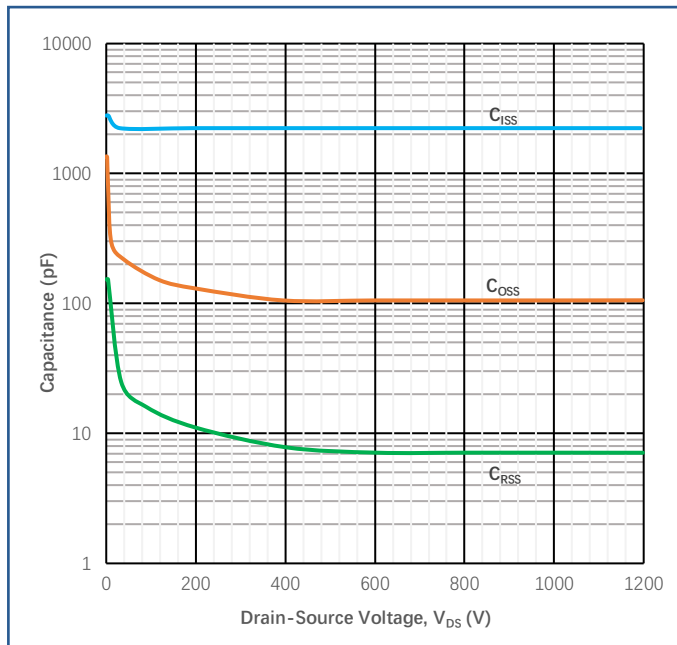


Figure 11
Capacitances vs. Drain-Source

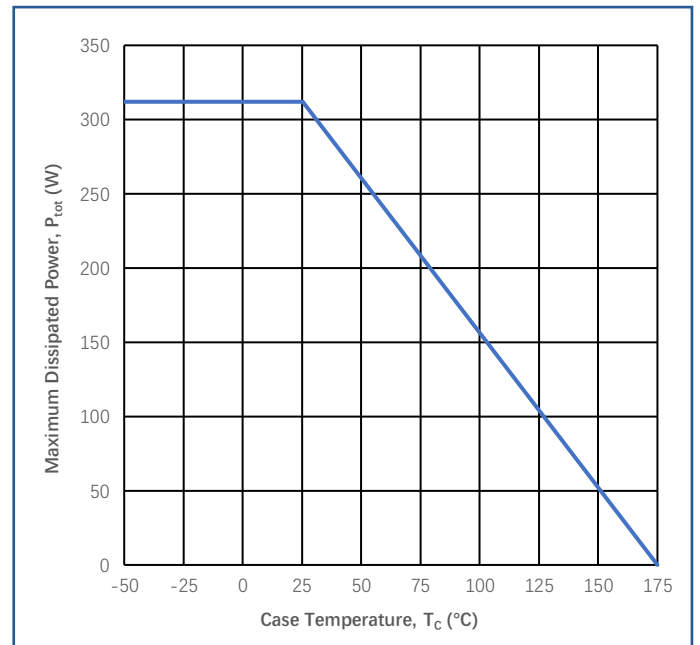


Figure 12
Max Power Dissipation Derating vs T_C

Typical Performance

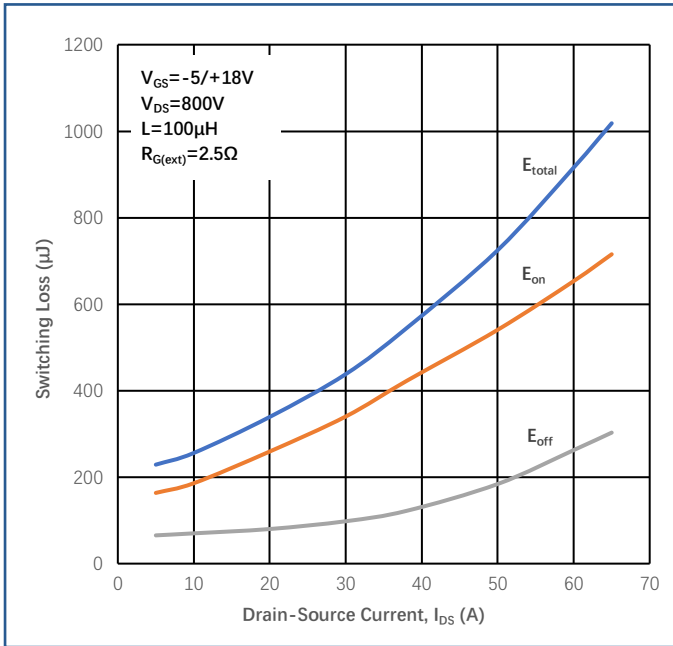


Figure 13
Switching Energy vs. Drain Current

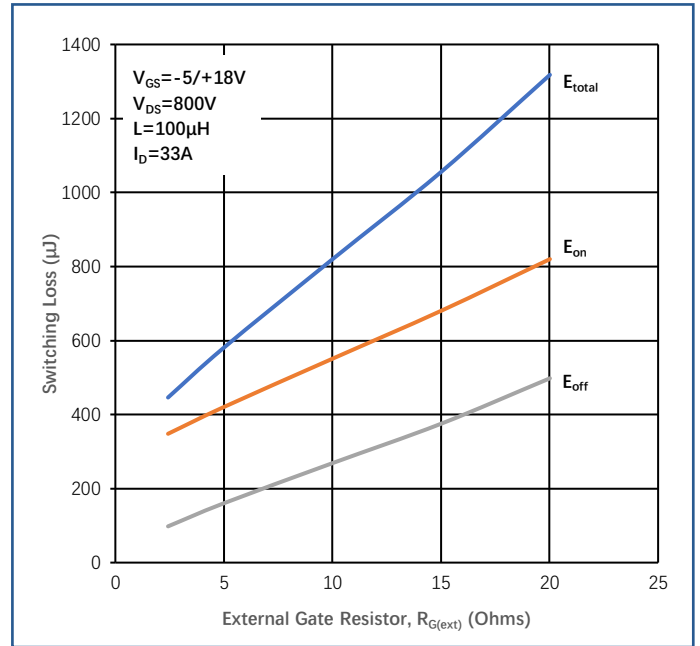


Figure 14
Switching Energy vs. $R_{G(\text{ext})}$

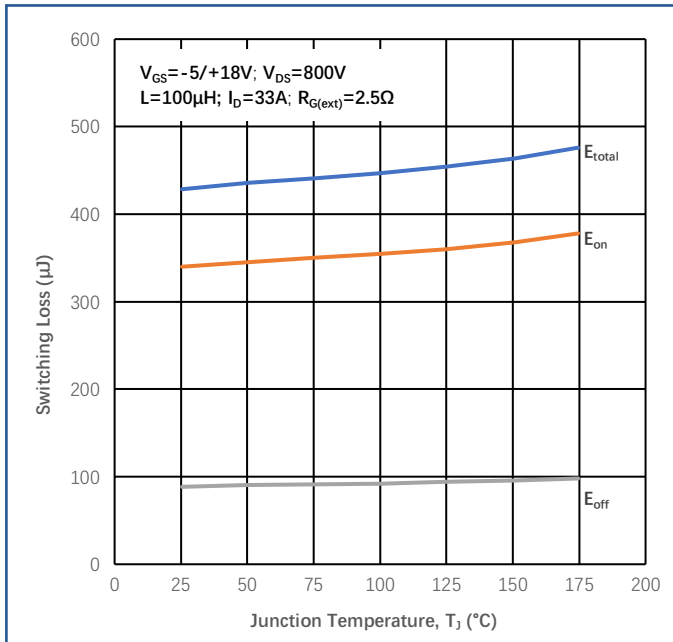


Figure 15
Switching Energy vs. Temperature

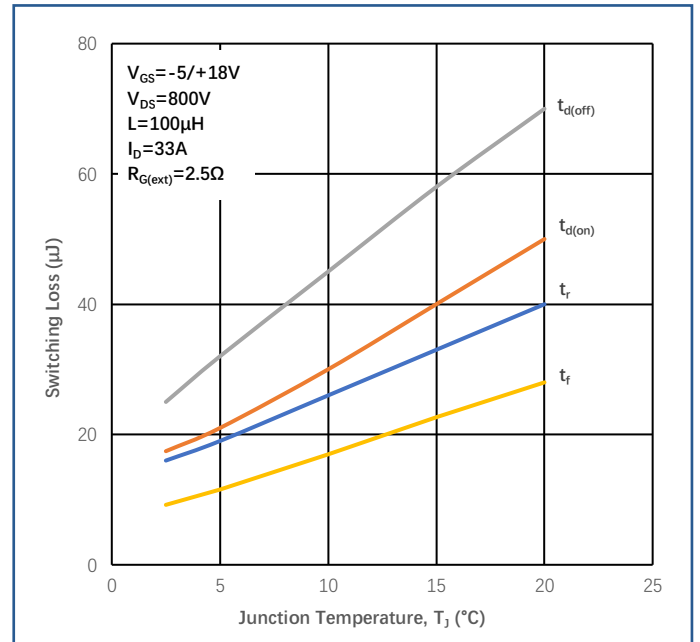


Figure 16
Switching Times vs. $R_{G(\text{ext})}$

Typical Performance

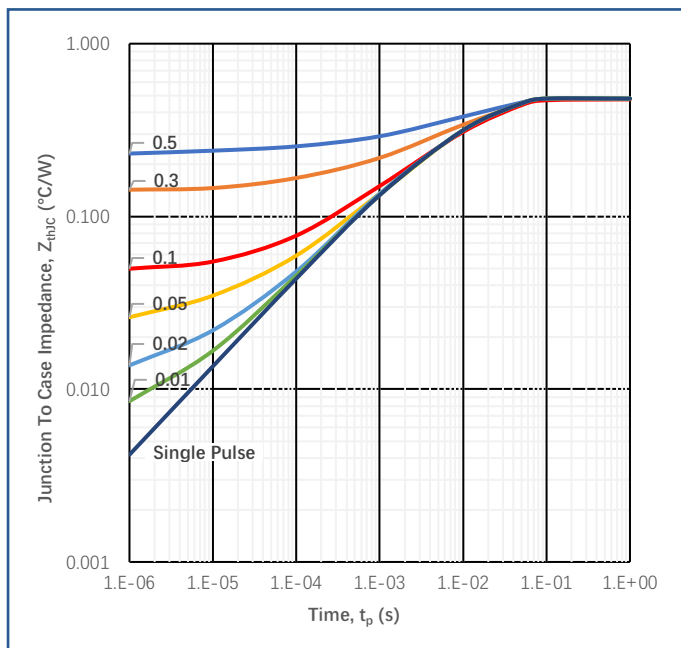


Figure 17
Transient Thermal Impedance

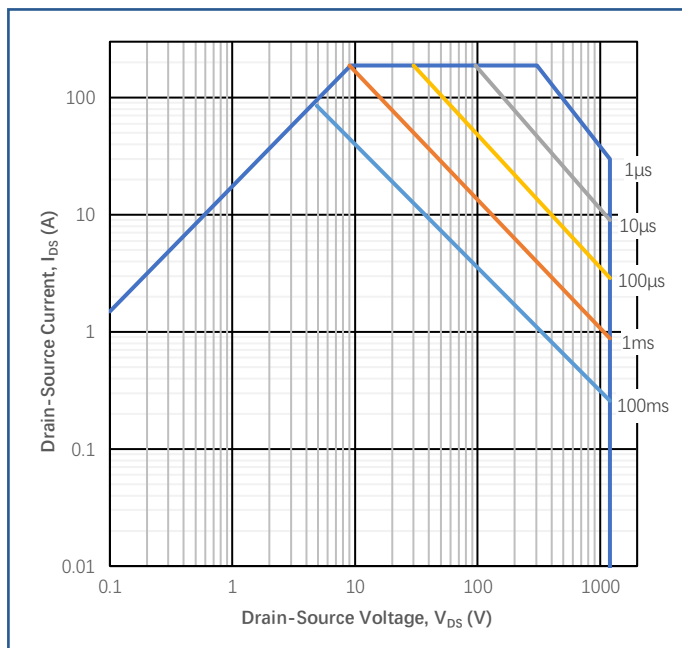
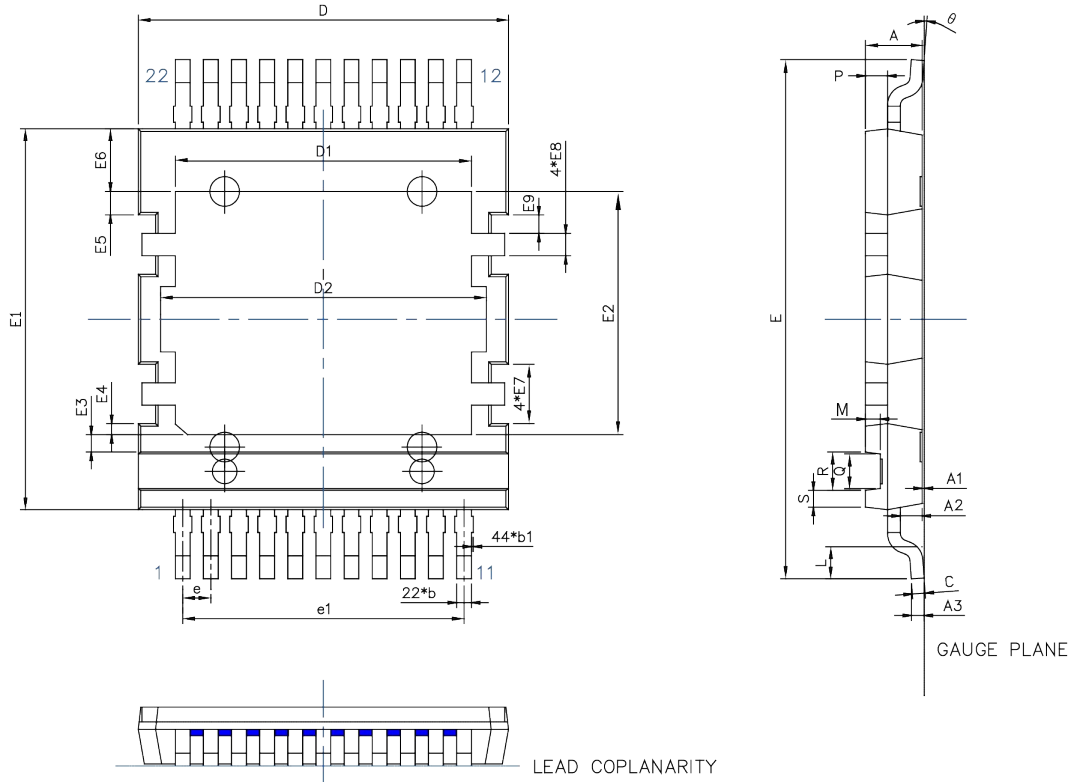


Figure 18
Safe Operating Area

Package Dimensions (mm)

Package Type: QDPAK



Symbol	Millimeters			Symbol	Millimeters		
	Min.	Type.	Max.		Min.	Type.	Max.
A	2.25	2.30	2.35	E5	0.95 REF		
A1	0.00	-	0.15	E6	2.53 REF		
A2	0.90 REF			E7	2.40 REF		
A3	0.50 BSC			E8	0.90 REF		
b	0.50	0.60	0.70	E9	0.75 REF		
b1	0.00	-	0.15	e	1.14 BSC		
c	0.46	0.52	0.58	e1	11.40 BSC		
D	14.90	15.00	15.10	L	1.30 REF		
D1	12.00 REF			M	0.60 REF		
D2	13.2 REF			P	0.90 REF		
E	20.81	20.96	21.11	Q	1.40 REF		
E1	15.30	15.40	15.50	R	1.545 REF		
E2	9.83 REF			S	0.68 REF		
E3	0.705 REF			θ	0°	-	8°
E4	0.45 REF						

Pin	Symbol	Description
1	G	Gate
2	KS	Kelvin Source
3-11	S	Power Source
12-22, Tab	D	Drain

Note:

1. All metal surfaces are Sn plated (matte), except area of cut.
2. Burr or mold flash size (0.5 mm) is not included in the dimensions.

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