



DESCRIPTION

The AM03NS10H is available in TO-220, TO-247, TO-263-2, TO-263-7, TOLL-8 Packages.

Package	BVDSS	RDSON	ID
TO-220 TO-247 TO-263-2	100V	2.7mΩ	180A
TO-263-7 TOLL-8	100V	2.3 mΩ	216A

FEATURE

- Fast Switching
- Low On-Resistance
- Low Gate Charge
- Low Reverse transfer capacitances
- $R_{DS(ON)typ.}=2.7m\Omega @ V_{GS}=10V$
- $R_{DS(ON)typ.}=2.3m\Omega @ V_{GS}=10V$
- High avalanche ruggedness

APPLICATION

- BMS
- High current switching applications

ORDERING INFORMATION

Package Type	Part Number	
TO-220 SPQ: 50pcs/Tube	T3	AM03NS10HT3U
		AM03NS10HT3VU
TO-247 SPQ: 50pcs/ Tube	TL3F	AM03NS10HTL3FU
		AM03NS10HTL3FVU
TO-263-2 SPQ:800pcs /Reel	S2	AM03NS10HS2R
		AM03NS10HS2VR
TO-263-7 SPQ:800pcs /Reel	S7	AM03NS10HS7R
		AM03NS10HS7VR
TOLL-8 SPQ:1,200 pcs /Reel	PH8	AM03NS10HPH8R
		AM03NS10HPH8VR
Note	V: Halogen free Package R: Tape & Reel U: Tube	
AiT provides all RoHS products		

PIN DESCRIPTION



ABSOLUTE MAXIMUM RATINGS

T_A = 25°C, unless otherwise specified.

Parameter	Symbol	TO-247	TO-220 TO-263-2	TO-263-7 TOLL-8	Unit
Drain-Source Voltage	BV _{DSS}	100			V
Continuous Drain Current, Silicon Limited	I _D	239	200	216	A
Continuous Drain Current, Package Limited		180		300	A
Continuous Drain Current @T _C =100°C, Silicon Limited		151.3	126.6	137	A
Pulsed Drain Current	I _{DM} (1)	720		864	A
Gate-Source Voltage	V _{GS}	±20			V
Avalanche Energy	E _{AS} (2)	784			mJ
Power Dissipation	P _D	357	250		W
Derating Factor above 25°C		2.85	2		W/°C
Storage Temperature Range	T _{STG}	-55 to 150			°C
Junction Temperature	T _J	150			°C
Maximum Temperature for Soldering	T _L	260			°C
THERMAL RESISTANCE (TO-247)					
Junction-to-Case	R _{θJC}	0.35			°C/W
Junction-to-Ambient	R _{θJA}	62.5			
THERMAL RESISTANCE (TO-220 / TO-263 / TOLL-8)					
Junction-to-Case	R _{θJC}	0.5			°C/W
Junction-to-Ambient	R _{θJA}	62.5			

(1) Repetitive Rating : Pulse width limited by maximum junction temperature

(2) L=0.5mH, I_{as}=56A, Start T_J =25°C

Stresses above may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated in the Electrical Characteristics are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



ELECTRICAL CHARACTERISTICS

T_A = 25°C, unless otherwise specified.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain to Source Breakdown Voltage	V _{DSS}	V _{GS} =0V, I _D =250μA	100	110	-	V
Drain to Source Leakage Current	I _{DSS}	V _{DS} = 100V, V _{GS} = 0V	-	-	1	μA
		V _{DS} = 80V, V _{GS} = 0V, T _A = 125°C	-	-	100	μA
Gate to Source Forward Leakage	I _{GSS(F)}	V _{GS} = +20V	-	-	100	nA
Gate to Source Reverse Leakage	I _{GSS(R)}	V _{GS} = -20V	-	-	-100	nA
ON CHARACTERISTICS (TO-247 / TO-220 / TO-263-2)						
Drain-to-Source On-Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =50A	-	2.7	3	mΩ
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} = V _{GS} , I _D = 250μA	2	3	4	V
ON CHARACTERISTICS (TO-263-7 / TOLL-8)						
Drain-to-Source On-Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =50A	-	2.3	3	mΩ
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} = V _{GS} , I _D = 250μA	2	3	4	V
Pulse width tp ≤ 300μs, δ ≤ 2%						
Dynamic CHARACTERISTICS						
Input Capacitance	C _{iss}	V _{DS} = 50V, V _{GS} = 0 f = 1MHz	-	9200	-	PF
Output Capacitance	C _{oss}		-	1130	-	
Reverse Transfer Capacitance	C _{rss}		-	110	-	
Total Gate Charge	Q _g	V _{DD} =50V, I _D =92.5A, V _{GS} =10V	-	131	-	nC
Gate-Source charge	Q _{gs}		-	50	-	
Gate-Drain charge	Q _{gd}		-	24.5	-	
Switching CHARACTERISTICS						
Turn-on Delay Time	t _{d(ON)}	V _{DD} =50V, V _{GS} =10V, R _G =1.6Ω, Resistive Load	-	32	-	ns
Rise Time	t _r		-	40	-	
Turn-Off Delay Time	t _{d(OFF)}		-	80	-	
Fall Time	t _f		-	35	-	
Source-Drain Diode CHARACTERISTICS (TO-247 / TO-220 / TO-263-2)						
Continuous Source Current	I _S		-	-	180	A
Maximum Pulsed Current	I _{SM}		-	-	720	A
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =50A	-	-	1.2	V
Reverse Recovery Time	T _{rr}	I _S =92.5A, V _{GS} =0, di/dt=100A/us	-	80	-	ns
Reverse Recovery Charge	Q _{rr}		-	195	-	nC
Source-Drain Diode CHARACTERISTICS (TO-263-7 / TOLL-8)						
Continuous Source Current	I _S		-	-	216	A
Maximum Pulsed Current	I _{SM}		-	-	864	A
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =50A	-	-	1.2	V
Reverse Recovery Time	T _{rr}	I _S =92.5A, V _{GS} =0, di/dt=100A/us	-	80	-	ns
Reverse Recovery Charge	Q _{rr}		-	195	-	nC



TYPICAL PERFORMANCE CHARACTERISTICS

TO-247 Package

Fig.1 Safe Operating Area

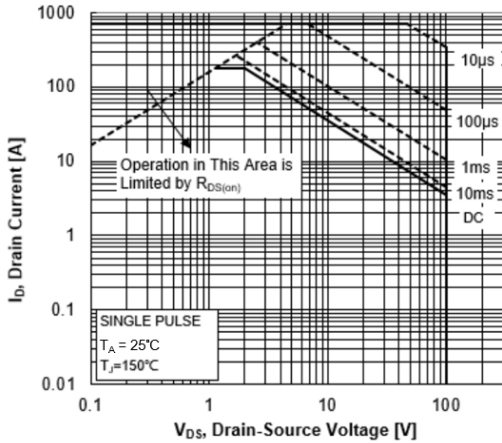


Fig.2 Maximum Power Dissipation vs. Case Temperature

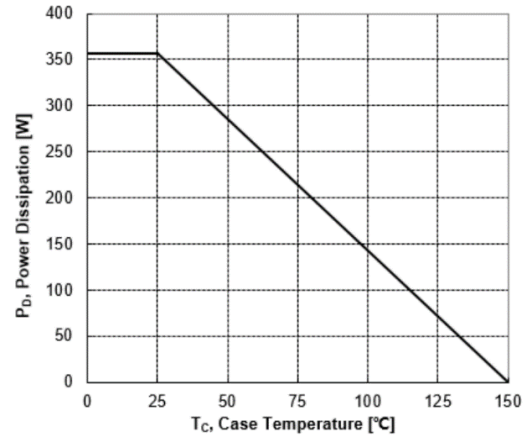


Fig.3 Maximum Continuous Drain Current vs. Case Temperature

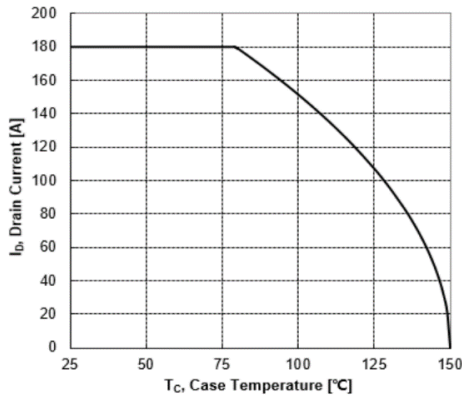


Fig.4 Typical Output Characteristics

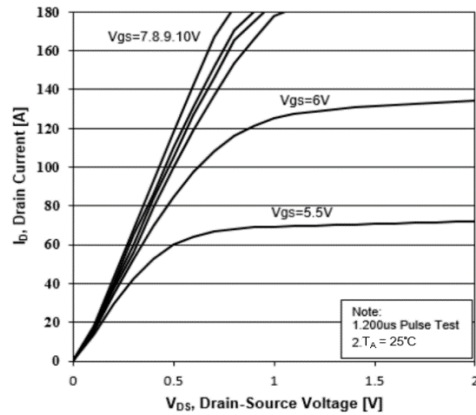


Fig.5 Transient Thermal Impedance

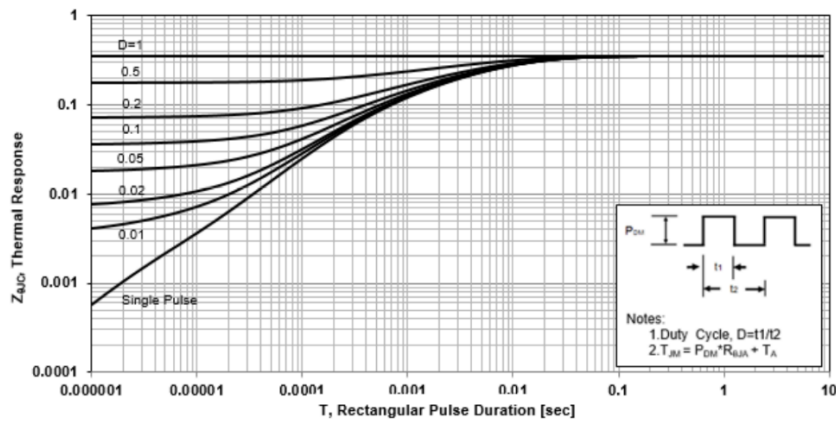




Fig.6 Typical Transfer Characteristics

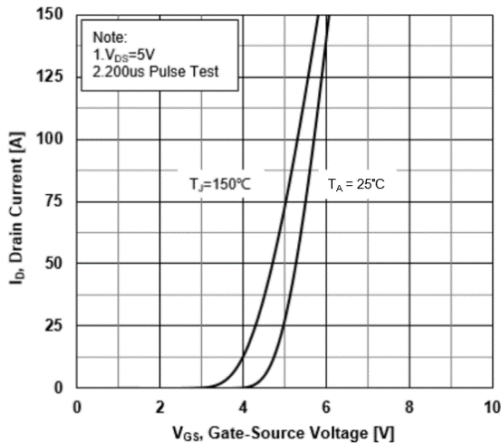


Fig.7 Source-Drain Diode Forward Characteristics

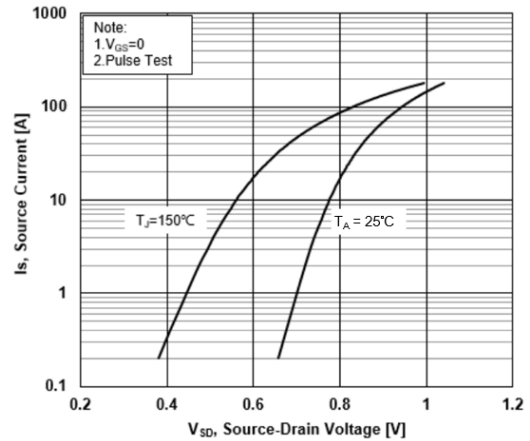


Fig.8 Drain-Source On-Resistance vs. Drain Current

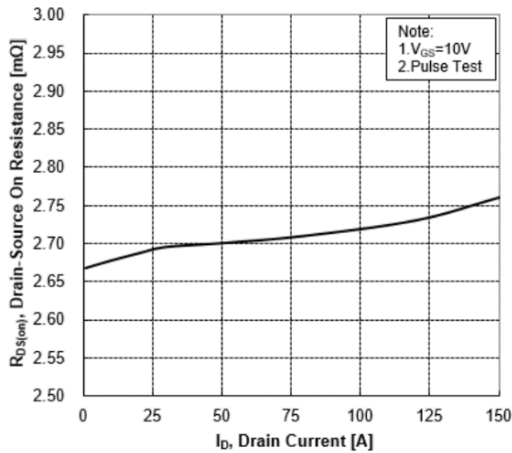


Fig.9 Normalized On-Resistance vs. Junction Temperature

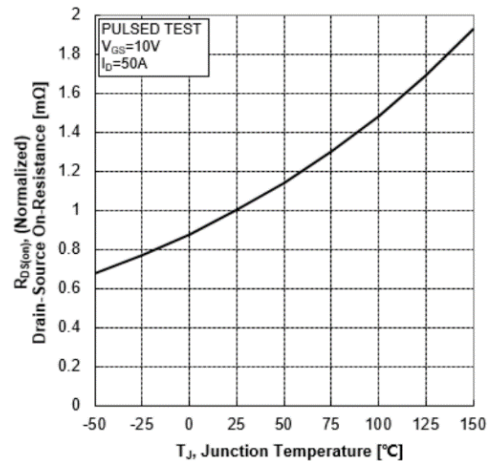


Fig.10 Normalized Threshold Voltage vs. Junction Temperature

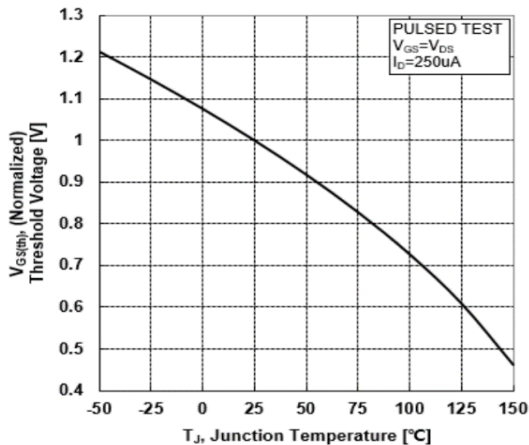


Fig.11 Normalized Breakdown Voltage vs. Junction Temperature

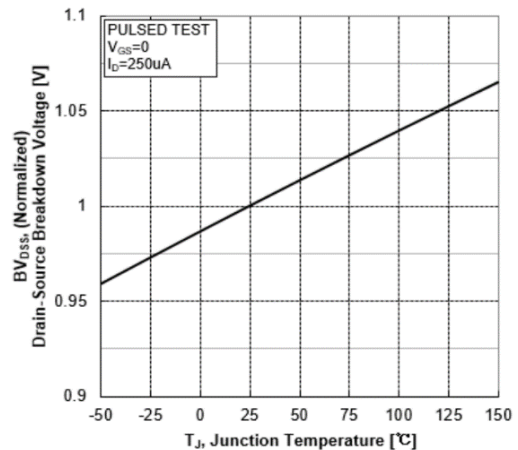




Fig.12 Capacitance Characteristics

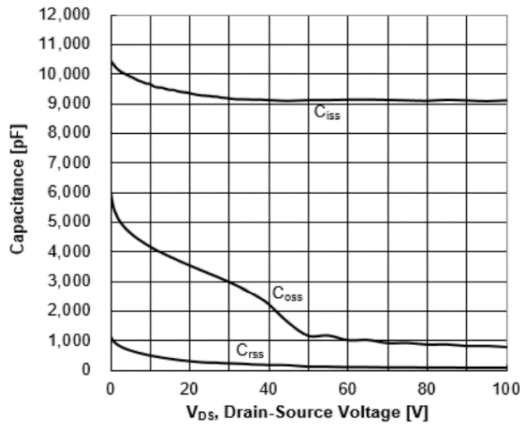
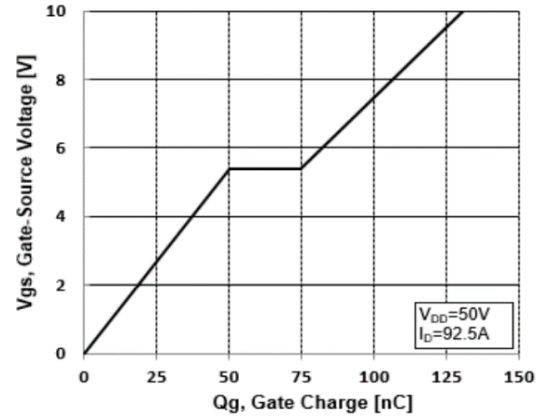


Fig.13 Typical Gate Charge vs. Gate-Source Voltage



TO-220 / TO-263 Package

Fig.14 Safe Operating Area

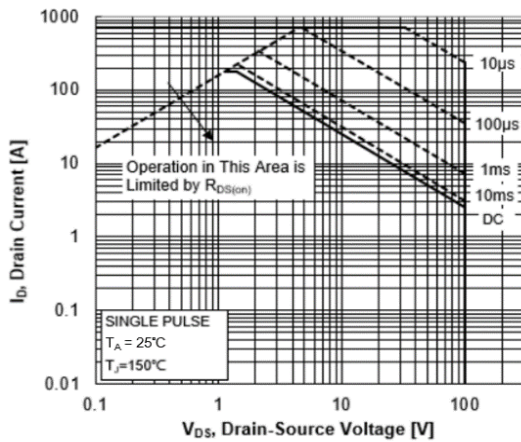


Fig.15 Maximum Power Dissipation vs. Case Temperature

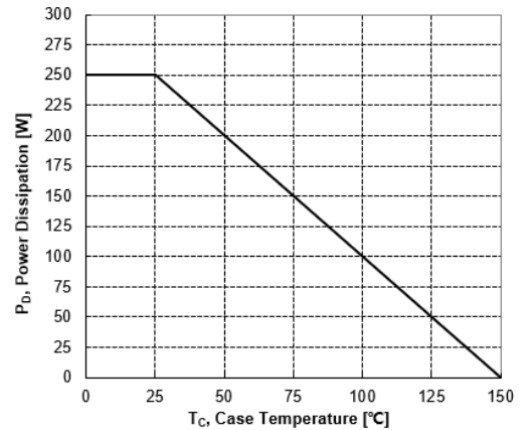


Fig.16 Maximum Continuous Drain Current vs. Case Temperature

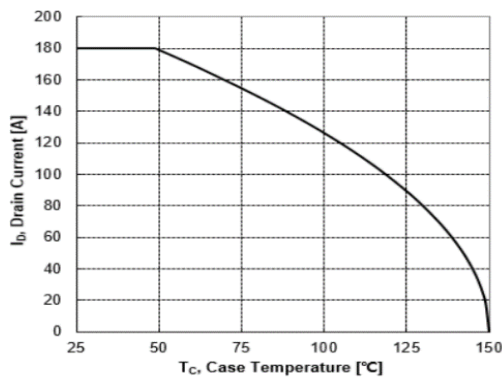


Fig.17 Case Temperature

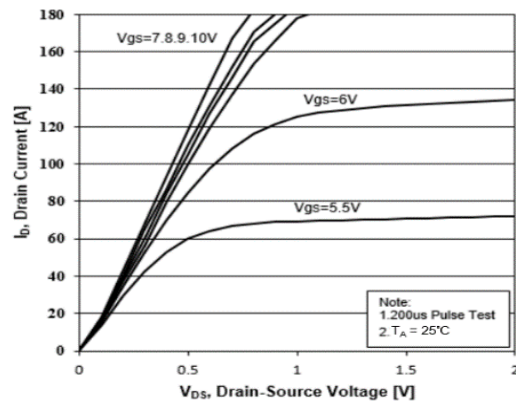




Fig.18 Transient Thermal Impedance

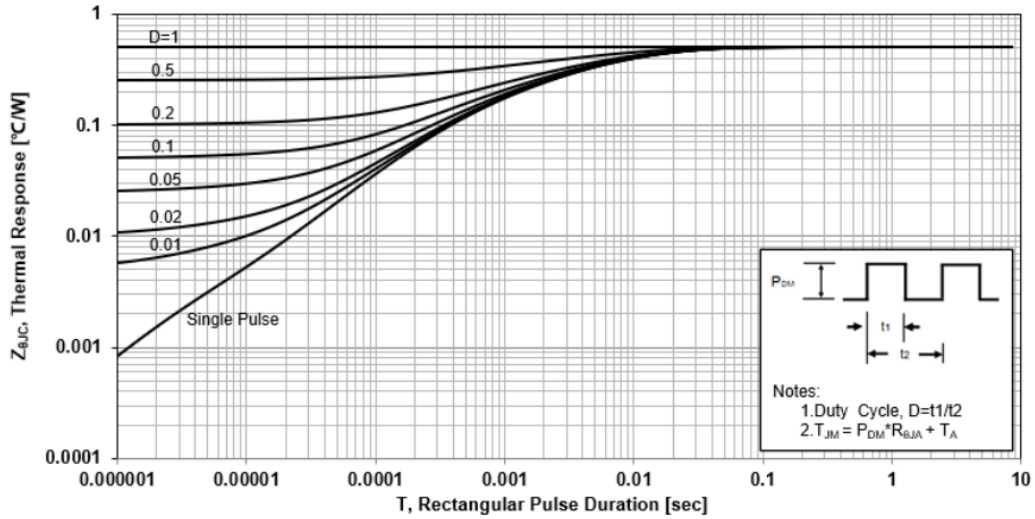


Fig.19 Typical Transfer Characteristics

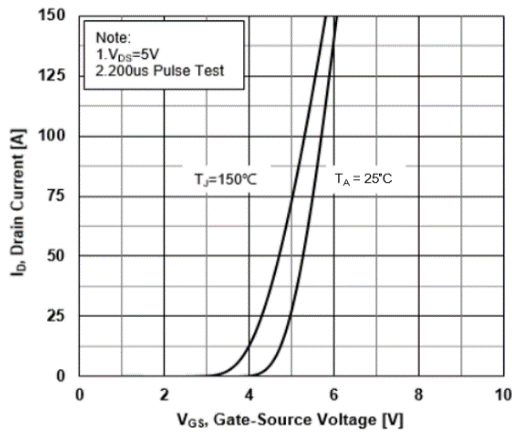


Fig.20 Source-Drain Diode Forward Characteristics

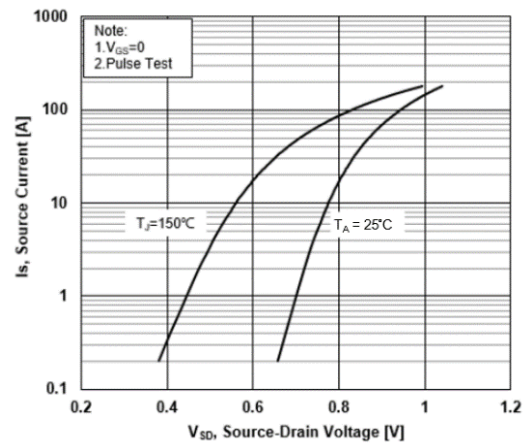


Fig.21 Drain-Source On-Resistance vs Drain Current

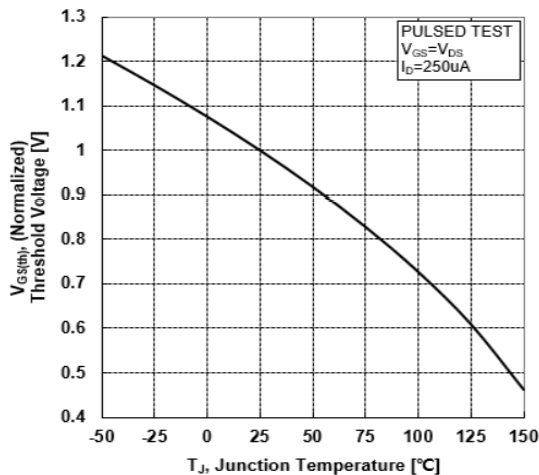


Fig.22 Normalized On-Resistance vs Junction Temperature

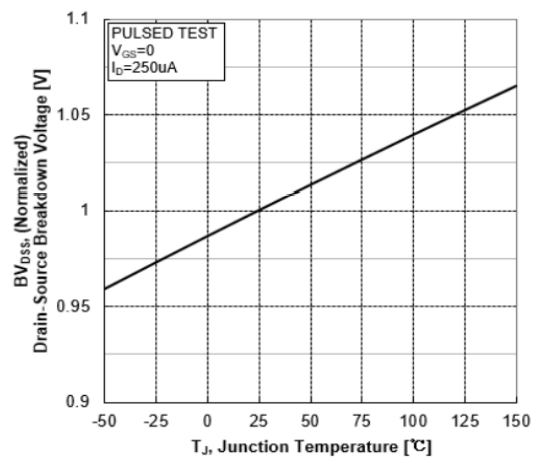




Fig.23 Capacitance Characteristics

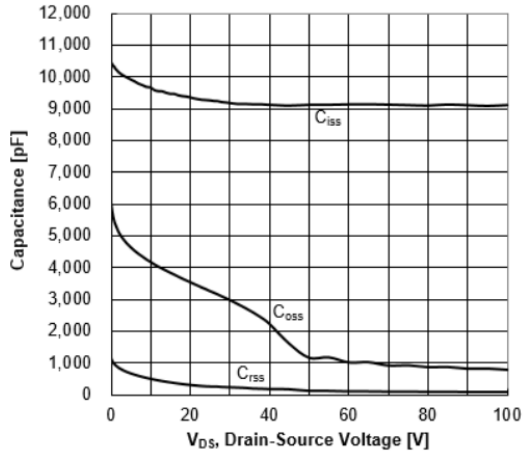
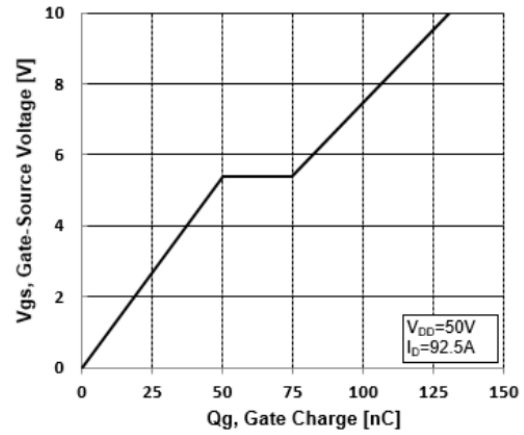


Fig.24 Typical Gate Charge vs Gate-Source Voltage



TO-263-7 / TOLL-8 Package

Fig.25 Safe Operating Area

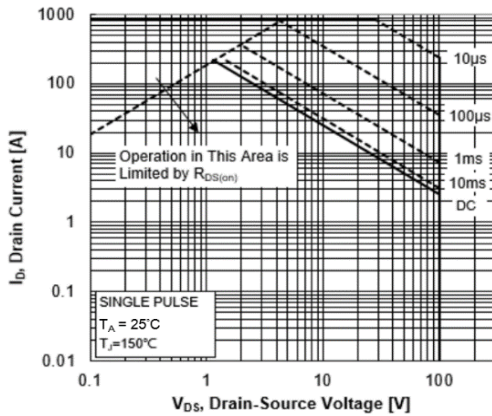


Fig.26 Maximum Power Dissipation vs Case Temperature

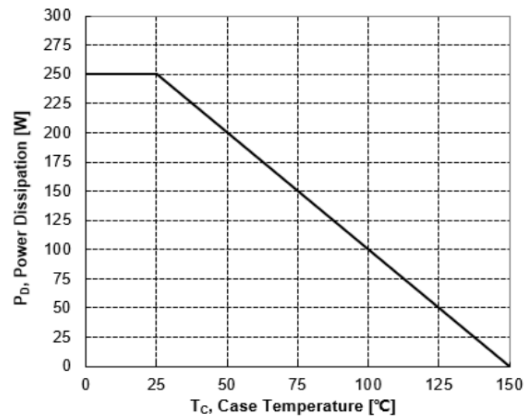


Fig.27 Maximum Continuous Drain Current vs. Case Temperature

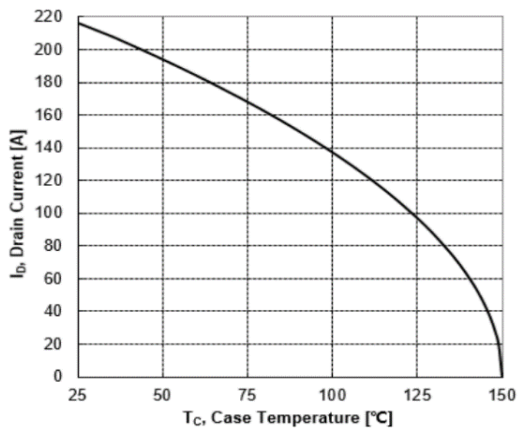


Fig.28 Case Temperature

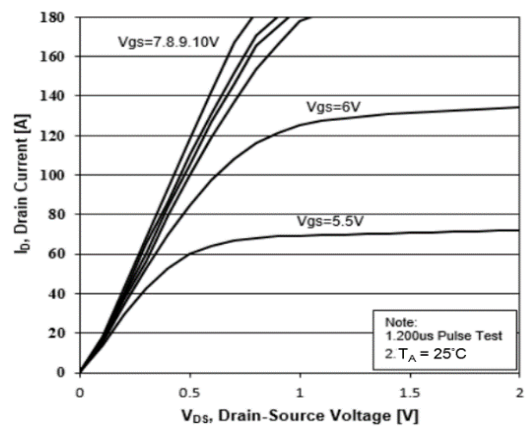




Fig.29 Transient Thermal Impedance

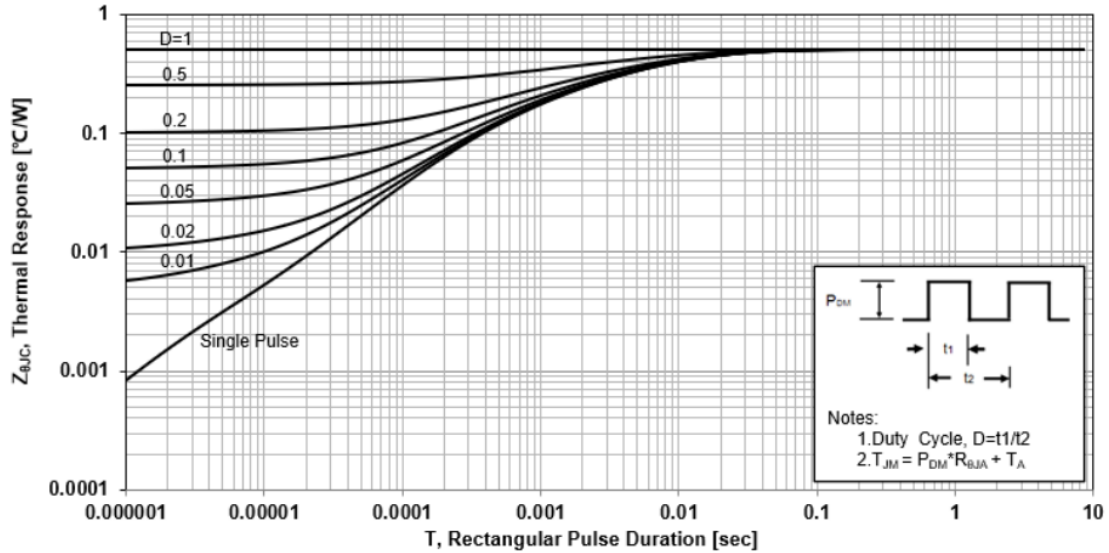


Fig.30 Typical Transfer Characteristics

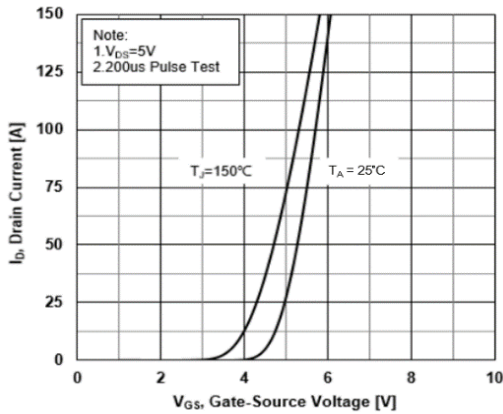


Fig.31 Source-Drain Diode Forward Characteristics

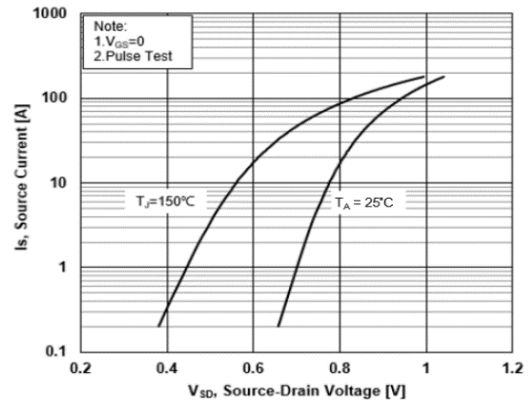


Fig.32 Drain-Source On-Resistance vs. Drain Current

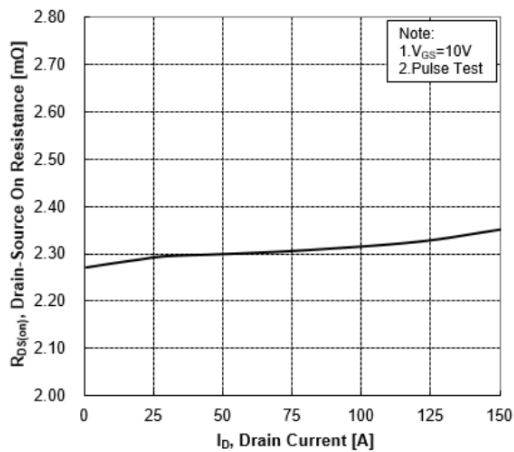


Fig.33 Normalized On-Resistance vs. Junction Temperature

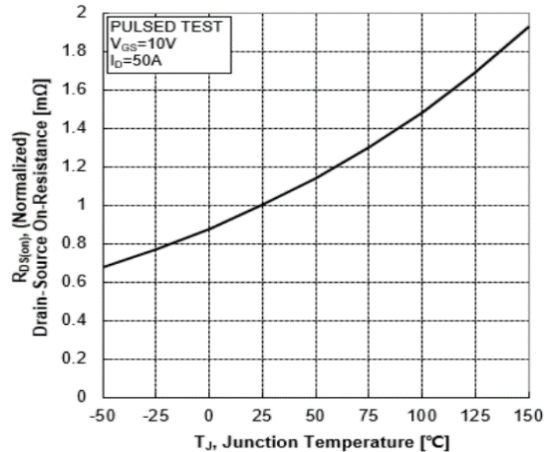




Fig.34 Normalized Threshold Voltage vs. Junction Temperature

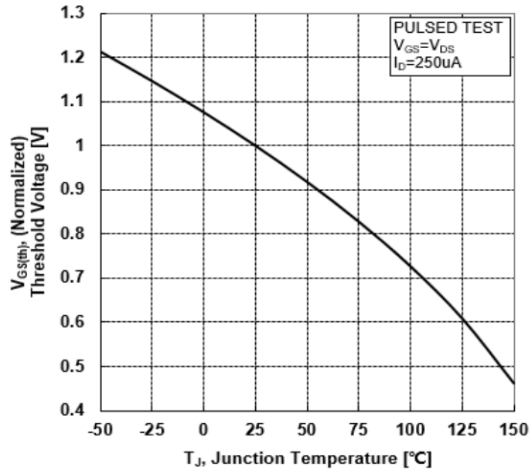


Fig.35 Normalized Breakdown Voltage vs. Junction Temperature

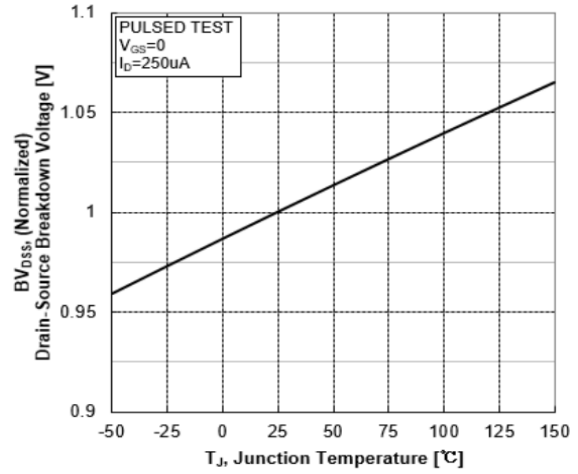


Fig.36 Capacitance Characteristics

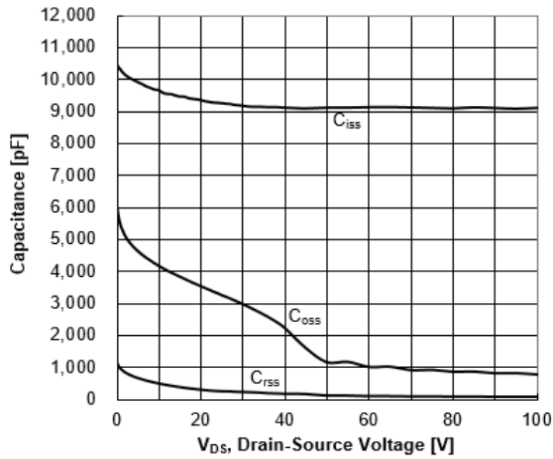
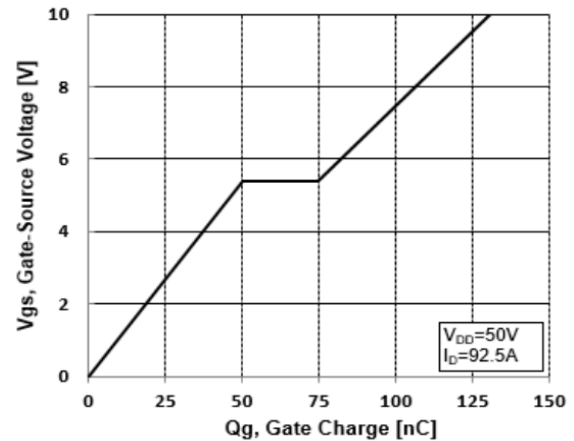


Fig.37 Typical Gate Charge vs. Gate-Source Voltage





TEST CIRCUIT AND WAVEFORM

Fig.38 Resistive Switching Test Circuit

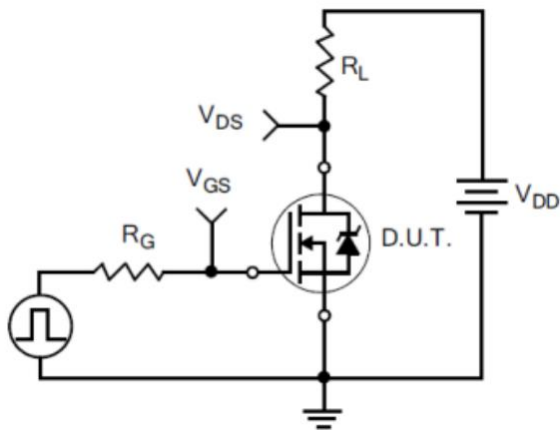


Fig.39 Resistive Switching Waveforms

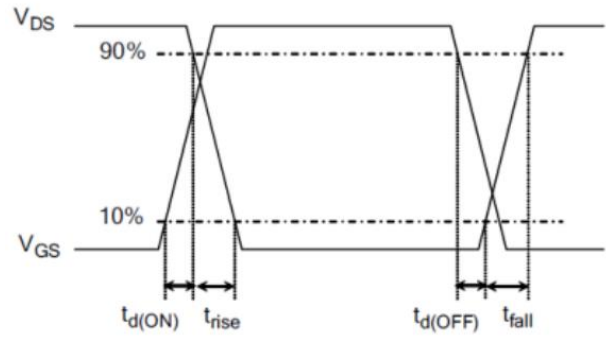


Fig.40 Gate Charge Test Circuit

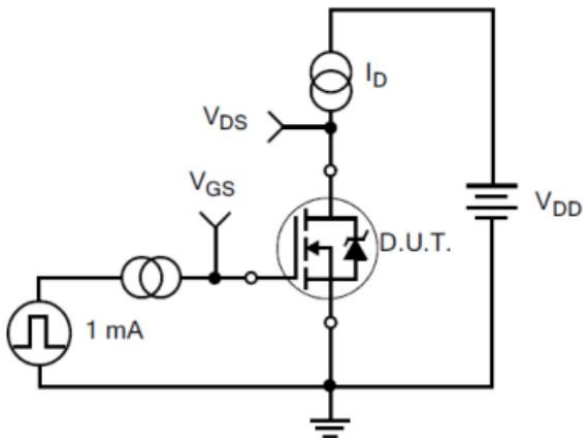


Fig.41 Gate Charge Waveforms

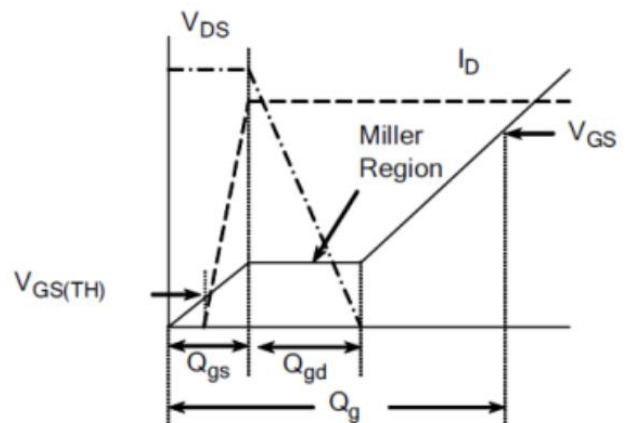




Fig.42 Diode Reverse Recovery Test Circuit

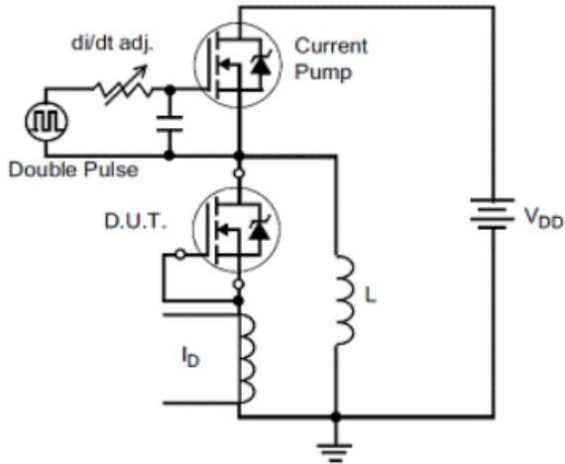


Fig.43 Diode Reverse Recovery Waveform

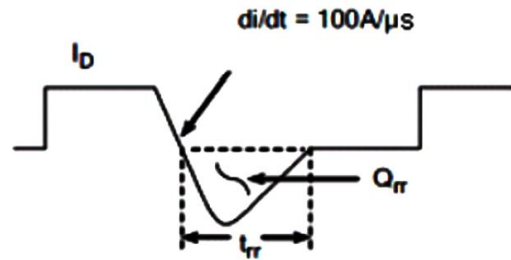


Fig.44 Unclamped Inductive Switching Test Circuit

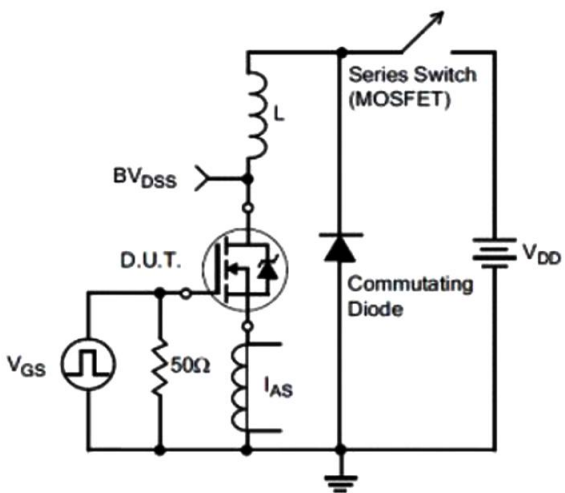
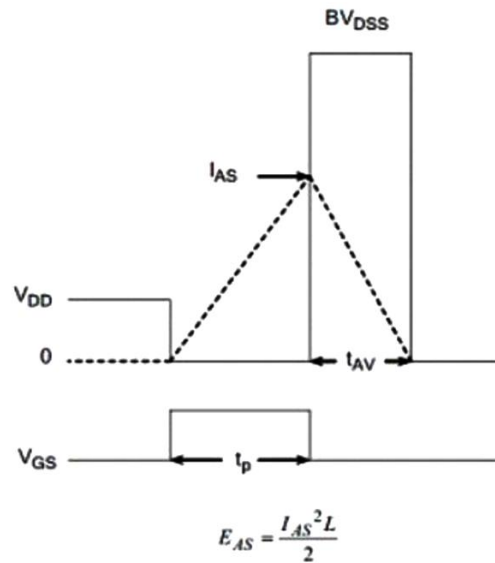


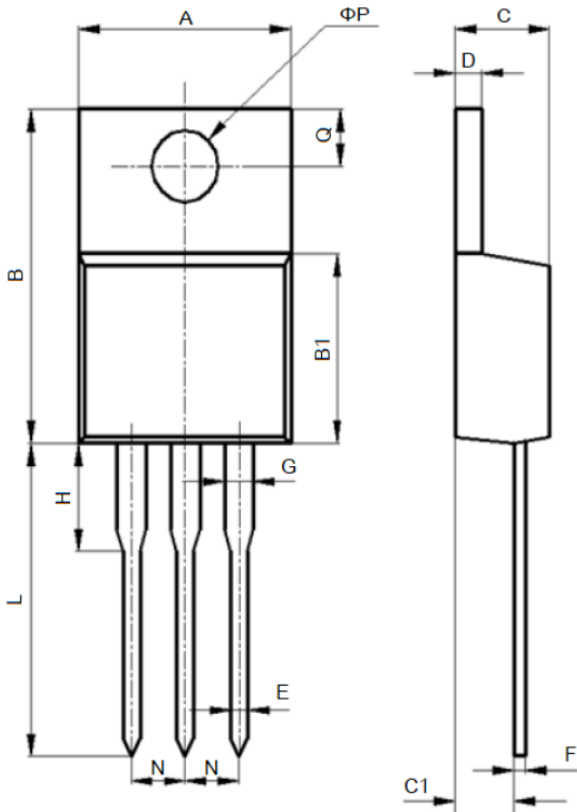
Fig.45 Unclamped Inductive Switching Waveform





PACKAGE INFORMATION

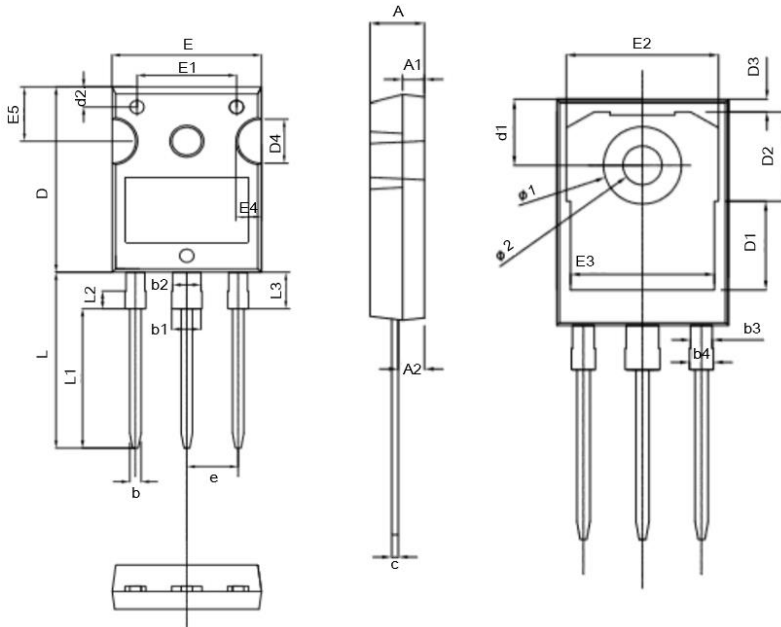
Dimension in TO-220 (Unit: mm)



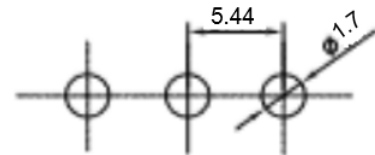
Symbol	Min.	Max.
A	9.60	10.6
B	15.0	16.0
B1	8.90	9.50
C	4.30	4.80
C1	2.30	3.10
D	1.20	1.40
E	0.70	0.90
F	0.30	0.60
G	1.17	1.37
H	2.70	3.80
L	12.6	14.8
N	2.34	2.74
Q	2.40	3.00
ΦP	3.50	3.90



Dimension in TO-247 (Unit: mm)



RECOMMENDED LAND PATTERN

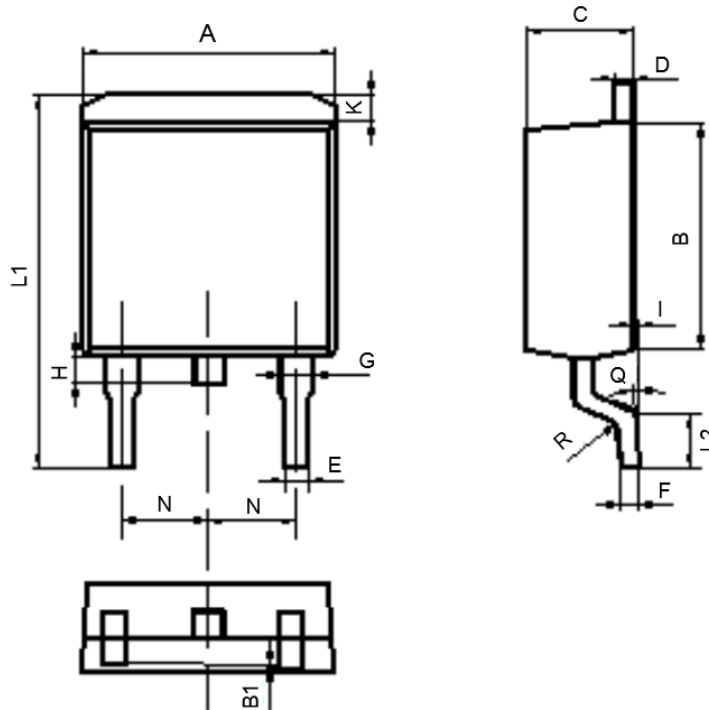


UNIT: mm

Symbol	Min.	Max.	Symbol	Min.	Max.
A	4.850	5.150	d2	2.200	2.400
A1	1.900	2.100	E	15.70	16.00
A2	2.270	2.540	E1	10.50	
b	1.100	1.300	E2	14.02	
b1	2.900	3.200	E3	13.50	
b2	2.900	3.100	E4	2.200	2.600
b3	1.900	2.100	E5	5.490	6.000
b4	2.000	2.200	e	5.340	5.540
c	0.550	0.680	L	19.72	20.12
D	20.80	21.10	L1	15.79	
D1	8.230		L2	1.980	
D2	8.320		L3	4.000	4.470
D3	1.170		Ø1	7.100	7.300
D4	3.680	5.100	Ø2	3.500	3.700
d1	6.040	6.300			



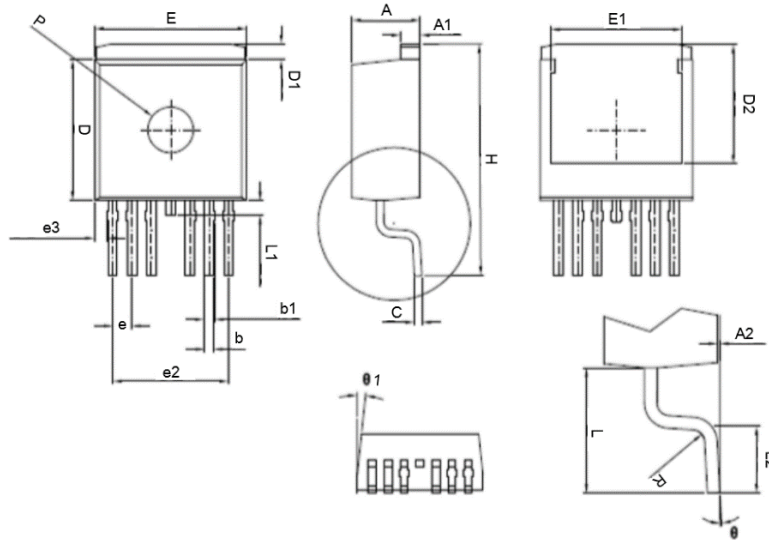
Dimension in TO-263 (Unit: mm)



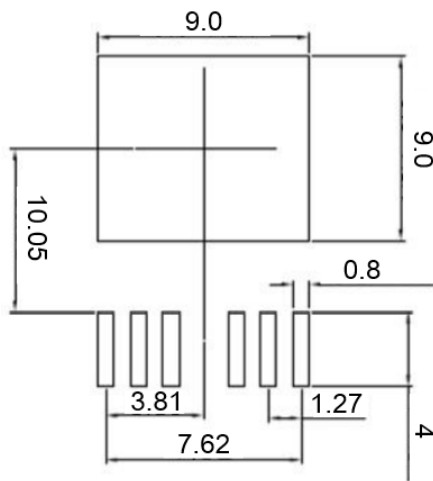
Symbol	Min.	Max.
A	9.800	10.40
B	8.900	9.500
B1	0.000	0.100
C	4.400	4.800
D	1.160	1.370
E	0.700	0.950
F	0.300	0.600
G	1.070	1.470
H	1.300	1.800
K	0.950	1.370
L1	14.50	16.50
L2	1.600	2.300
I	0.000	0.200
Q	0°	8°
R	0.400	0.400
N	2.390	2.690



Dimension in TO-263-7 (Unit: mm)



RECOMMENDED LAND PATTERN

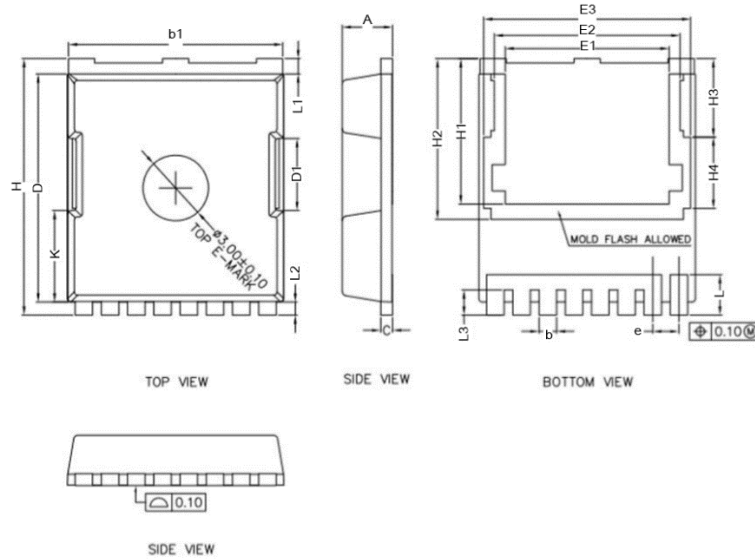


UNIT: mm

Symbol	Min.	Max.
A	4.300	4.700
A1	1.200	1.400
A2	0.050	0.300
b	0.500	0.700
b1	0.500	0.900
c	0.400	0.600
D	9.050	9.450
D1	0.700	1.300
D2	7.350	8.350
E	9.800	10.20
E1	8.100	9.100
e	1.070	1.470
e2	7.320	7.920
e3	0.640	1.040
H	14.65	15.65
L	4.470	5.470
L1	0.900	1.500
L2	2.200	2.800
θ	0°	8°
θ1	0°	10°
Φ	2.700	3.300



Dimension in TOLL-8 (Unit: mm)



Symbol	Min.	Max.
A	2.200	2.400
b	0.700	0.900
b1	9.700	9.900
c	0.400	0.600
D	10.28	10.58
D1	3.150	3.450
E	9.700	10.10
E1	7.350	7.650
E2	8.350	8.650
E3	9.310	9.610
e	1.100	1.300
H	11.48	11.88
H1	6.550	6.750
H2	7.200	7.500
H3	3.440	3.740
H4	3.110	3.410
K	4.030	4.330
L	1.600	2.100
L1	0.550	0.850
L2	0.450	0.750
L3	1.000	1.300



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