SamHop Microelectronics Corp.

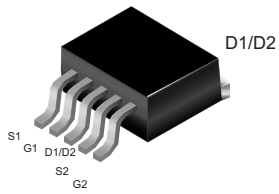
STB458D

Ver 1.0

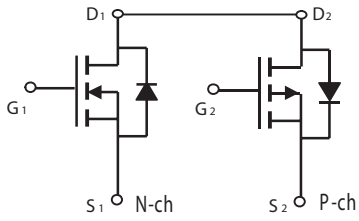
Dual Enhancement Mode Field Effect Transistor (N and P Channel)

PRODUCT SUMMARY (N-Channel)		
VDSS	ID	RDS(ON) (mΩ) Max
40V	30A	10.5 @ VGS=10V
		14 @ VGS=4.5V

PRODUCT SUMMARY (P-Channel)		
VDSS	ID	RDS(ON) (mΩ) Max
-40V	-24A	17 @ VGS=-10V
		24 @ VGS=-4.5V



STB SERIES
TO-263 5L



ABSOLUTE MAXIMUM RATINGS (T_C=25°C unless otherwise noted)

Symbol	Parameter		N-Channel	P-Channel	Units
V_{DS}	Drain-Source Voltage		40	-40	V
V_{GS}	Gate-Source Voltage		±20	±20	V
I_D	Drain Current-Continuous [a]	T_C=25°C	30	-24	A
		T_C=70°C	23.7	-19	A
I_{DM}	-Pulsed [b]		68	-60	A
E_{AS}	Sigle Pulse Avalanche Energy [d]		170	210	mJ
P_D	Maximum Power Dissipation [a]	T_C=25°C	15.6		W
		T_C=70°C	10		W
T_J, T_{STG}	Operating Junction and Storage Temperature Range		-55 to 150		°C

THERMAL CHARACTERISTICS

$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	8	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	80	°C/W

N-Channel ELECTRICAL CHARACTERISTICS (T_C=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
OFF CHARACTERISTICS						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	40			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=32V , V_{GS}=0V			1	A
I_{GSS}	Gate-Body leakage current	V_{GS}= ±20V , V_{DS}=0V			±100	nA
ON CHARACTERISTICS						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} , I_D=250uA	1	1.9	3	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=10V , I_D=15A		8.5	10.5	m ohm
		V_{GS}=4.5V , I_D=13A		10.5	14	m ohm
g_{FS}	Forward Transconductance	V_{DS}=10V , I_D=15A		65		S
DYNAMIC CHARACTERISTICS [c]						
C_{ISS}	Input Capacitance	V_{DS}=20V,V_{GS}=0V f=1.0MHz		1500		pF
C_{OSS}	Output Capacitance			250		pF
C_{RSS}	Reverse Transfer Capacitance			170		pF
SWITCHING CHARACTERISTICS [c]						
$t_{D(ON)}$	Turn-On DelayTime	V_{DD}=20V I_D=1A V_{GS}=10V R_{GEN}=6 ohm		25		ns
t_r	Rise Time			30		ns
$t_{D(OFF)}$	Turn-Off DelayTime			65		ns
tf	Fall Time			40		ns
Q_g	Total Gate Charge	V_{DS}=20V,I_D=15A,V_{GS}=10V		25		nC
		V_{DS}=20V,I_D=15A,V_{GS}=4.5V		12.5		nC
Q_{gs}	Gate-Source Charge	V_{DS}=20V,I_D=15A, V_{GS}=10V		2.6		nC
Q_{gd}	Gate-Drain Charge			7		nC
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
V_{SD}	Diode Forward Voltage	V_{GS}=0V,I_S=6A		0.8	1.3	V

P-Channel ELECTRICAL CHARACTERISTICS (T_C=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
OFF CHARACTERISTICS						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250uA	-40			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-32V , V_{GS}=0V			-1	uA
I_{GSS}	Gate-Body Leakage Current	V_{GS}= ±20V , V_{DS}=0V			±100	nA
ON CHARACTERISTICS						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} , I_D=-250uA	-1	-1.6	-3	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=-10V , I_D=-12A		13.5	17	m ohm
		V_{GS}=-4.5V , I_D=-10A		18	24	m ohm
g_{FS}	Forward Transconductance	V_{DS}=-10V , I_D=-12A		29		S
DYNAMIC CHARACTERISTICS [c]						
C_{ISS}	Input Capacitance	V_{DS}=-20V,V_{GS}=0V f=1.0MHz		2480		pF
C_{OSS}	Output Capacitance			350		pF
C_{RSS}	Reverse Transfer Capacitance			260		pF
SWITCHING CHARACTERISTICS [c]						
$t_{D(ON)}$	Turn-On Delay Time	V_{DD}=-20V I_D=-1A V_{GS}=-10V R_{GEN}=3 ohm		39		ns
t_r	Rise Time			70		ns
$t_{D(OFF)}$	Turn-Off Delay Time			320		ns
t_f	Fall Time			120		ns
Q_g	Total Gate Charge	V_{DS}=-20V,I_D=-12A,V_{GS}=-10V		61		nC
		V_{DS}=-20V,I_D=-12A,V_{GS}=-4.5V		31		nC
Q_{gs}	Gate-Source Charge	V_{DS}=-20V,I_D=-12A, V_{GS}=-10V		5		nC
Q_{gd}	Gate-Drain Charge			17		nC
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
V_{SD}	Diode Forward Voltage	V_{GS}=0V,I_S=-5A		-0.8	-1.2	V

Notes

a.Surface Mounted on FR4 Board,t ≤ 10sec.

b.Pulse Test:Pulse Width ≤ 300us, Duty Cycle ≤ 2%.

c.Guaranteed by design, not subject to production testing.

d.Starting T_J=25°C,L=0.5mH,V_{DD} = 20V,V_{GS}=10V.(See Figure13)

N-Channel

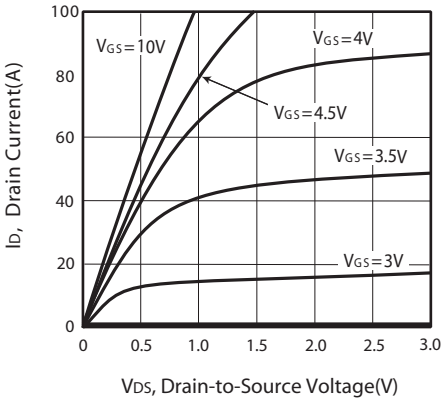


Figure 1. Output Characteristics

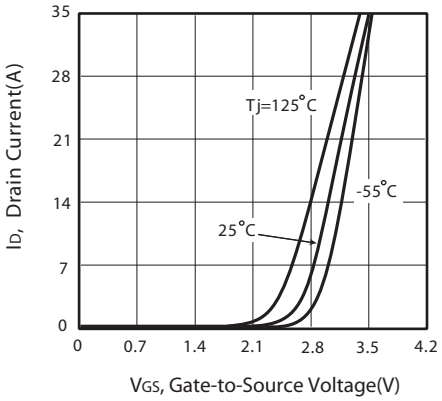


Figure 2. Transfer Characteristics

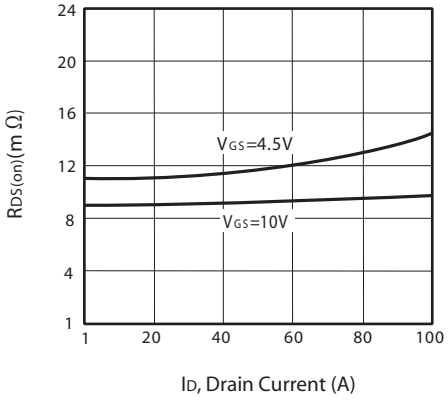


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

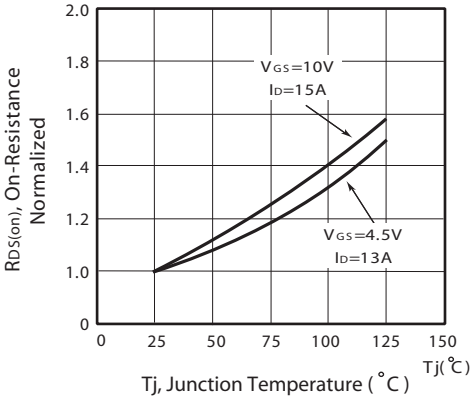


Figure 4. On-Resistance Variation with Drain Current and Temperature

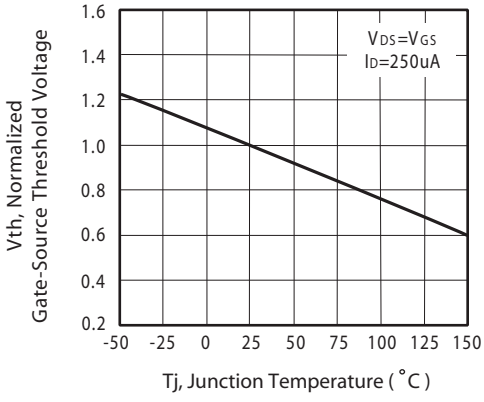


Figure 5. Gate Threshold Variation with Temperature

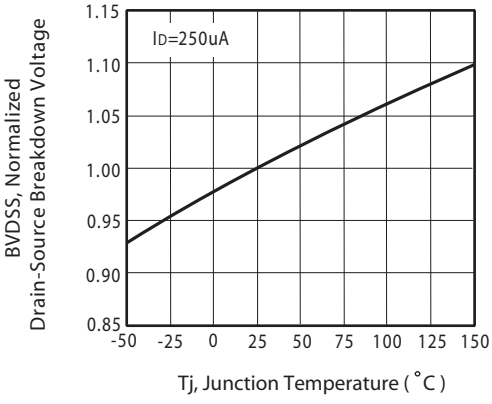


Figure 6. Breakdown Voltage Variation with Temperature

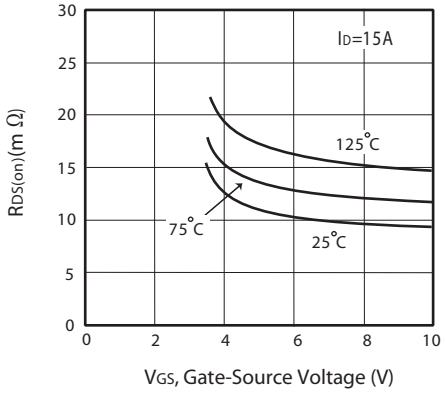


Figure 7. On-Resistance vs. Gate-Source Voltage

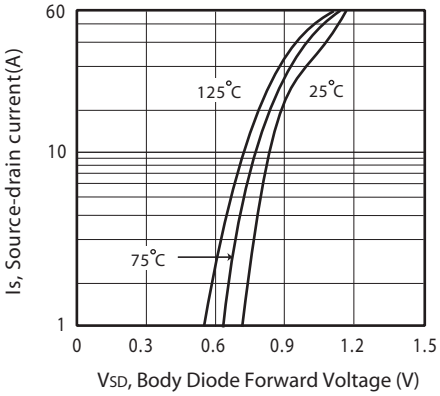


Figure 8. Body Diode Forward Voltage Variation with Source Current

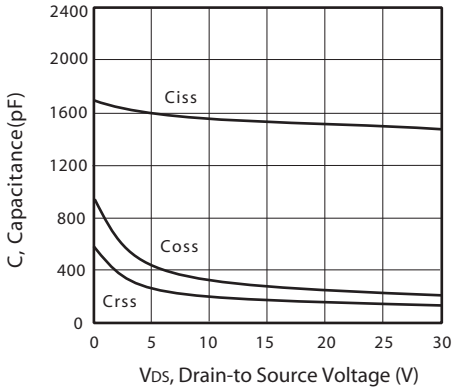


Figure 9. Capacitance

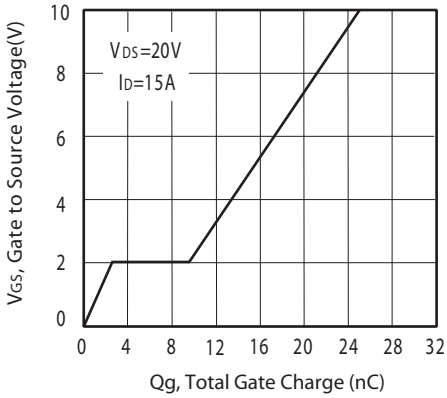


Figure 10. Gate Charge

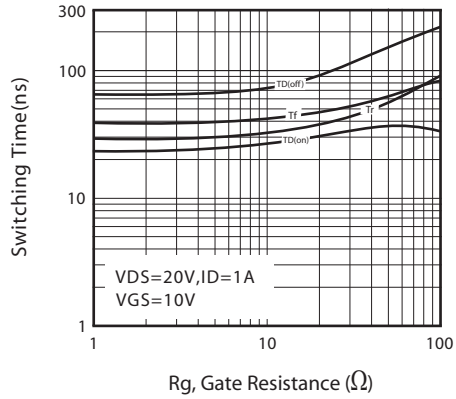


Figure 11. Switching Characteristics

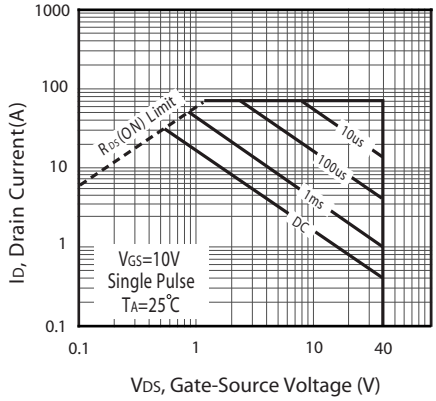
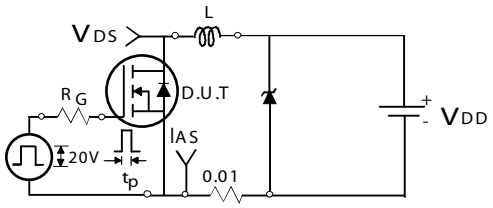
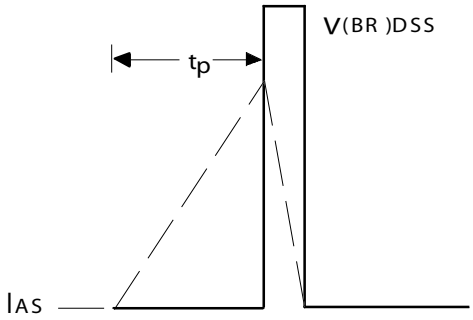


Figure 12. Maximum Safe Operating Area



Unclamped Inductive Test Circuit

Figure 13a.



Unclamped Inductive Waveforms

Figure 13b.

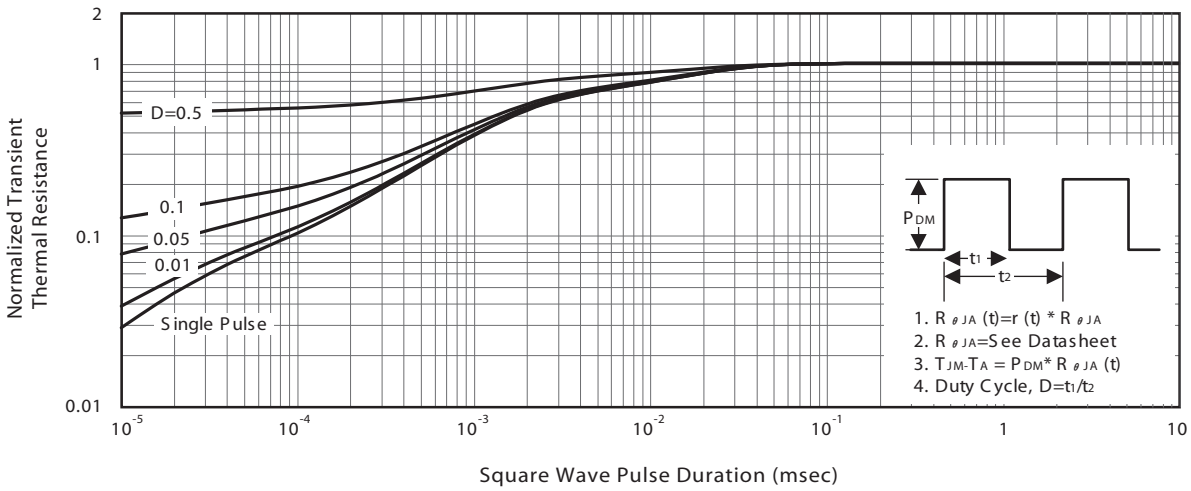


Figure 14. Normalized Thermal Transient Impedance Curve

P-Channel

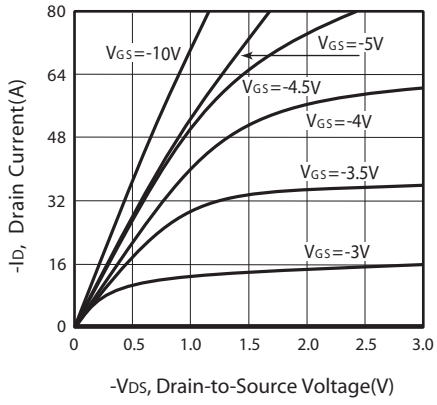


Figure 1. Output Characteristics

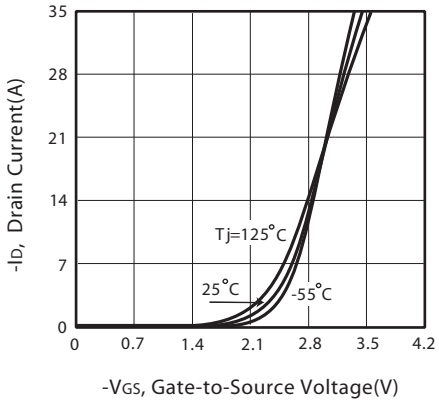


Figure 2. Transfer Characteristics

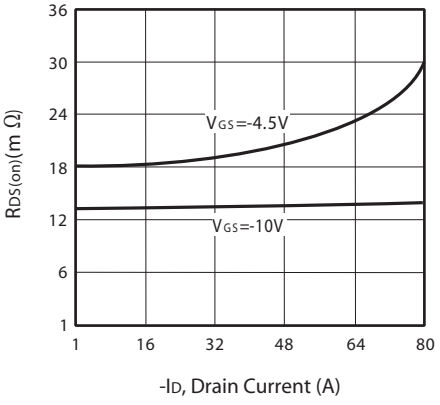


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

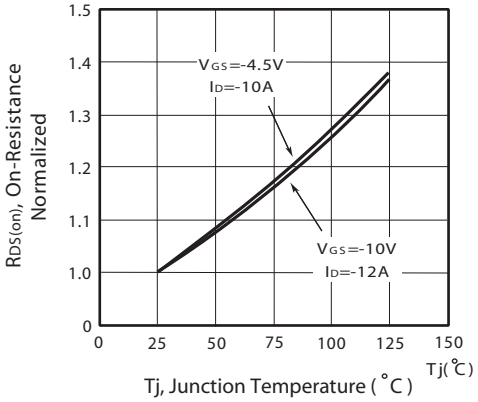


Figure 4. On-Resistance Variation with Drain Current and Temperature

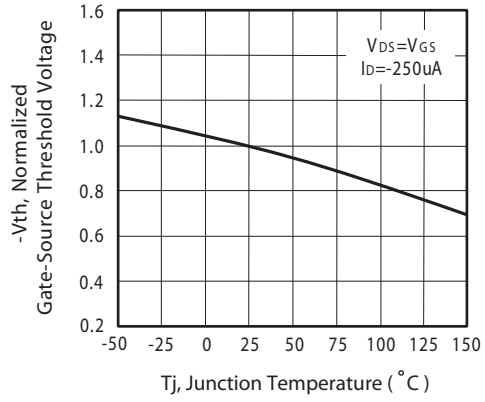


Figure 5. Gate Threshold Variation with Temperature

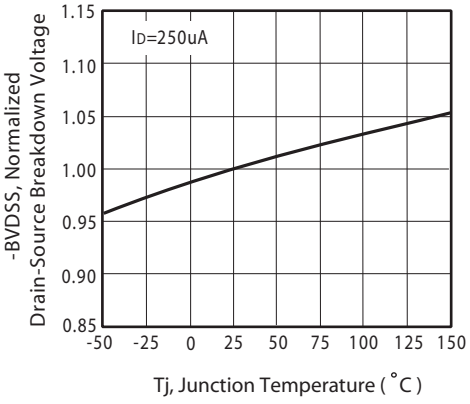


Figure 6. Breakdown Voltage Variation with Temperature

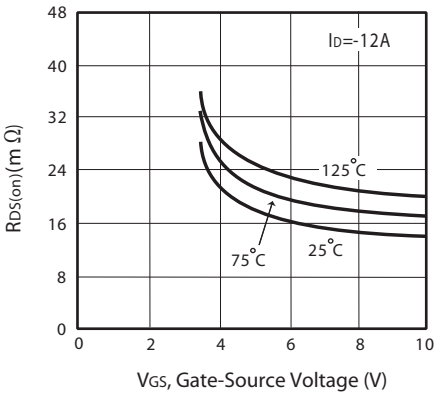


Figure 7. On-Resistance vs. Gate-Source Voltage

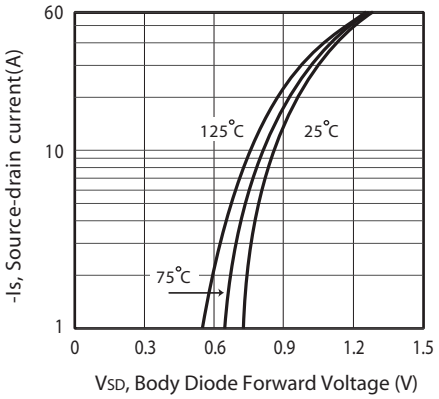


Figure 8. Body Diode Forward Voltage Variation with Source Current

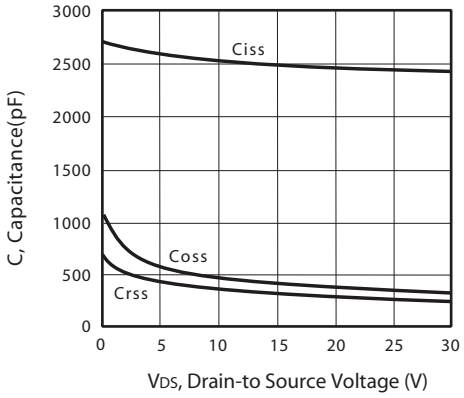


Figure 9. Capacitance

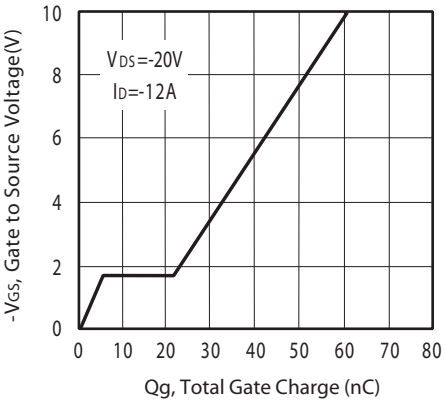


Figure 10. Gate Charge

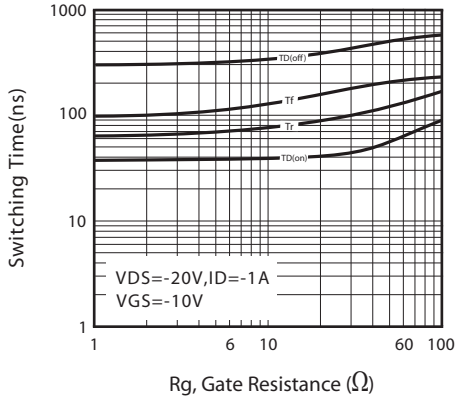


Figure 11. Switching Characteristics

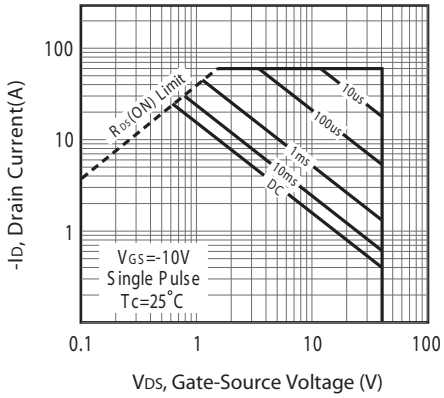
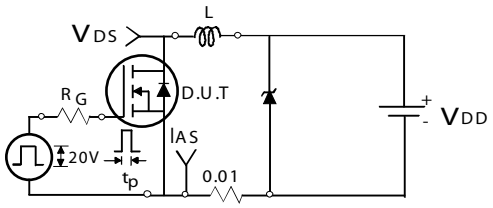
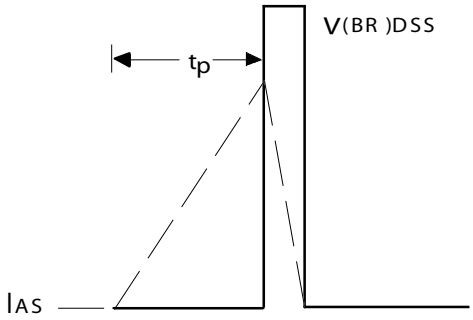


Figure 12. Maximum Safe Operating Area



Unclamped Inductive Test Circuit

Figure 13a.



Unclamped Inductive Waveforms

Figure 13b.

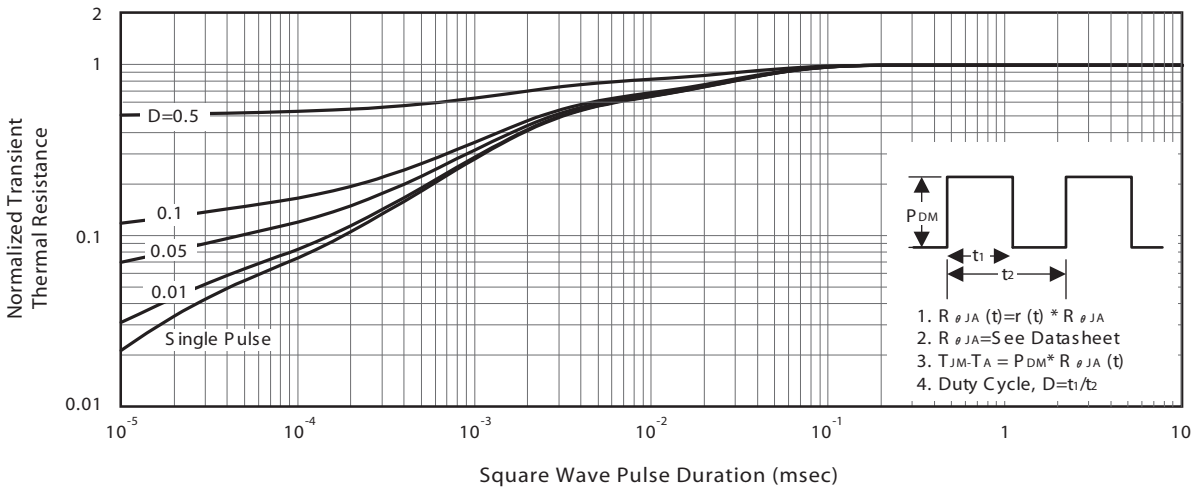
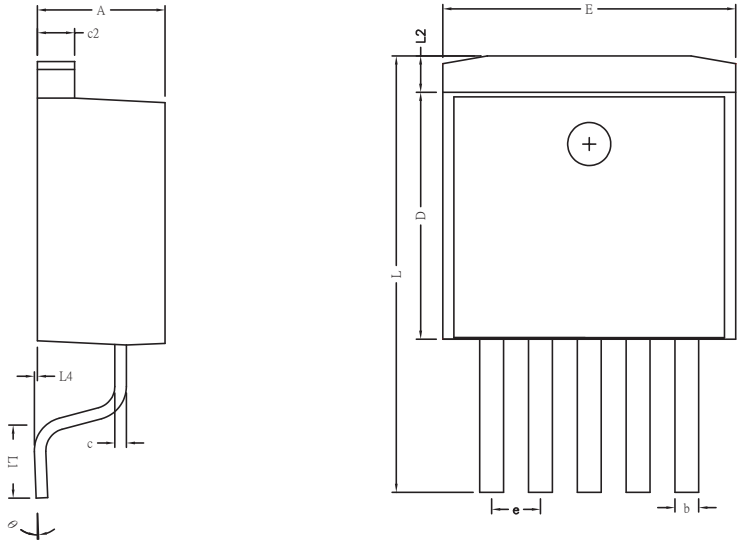


Figure 14. Normalized Thermal Transient Impedance Curve

PACKAGE OUTLINE DIMENSIONS

TO-263AB

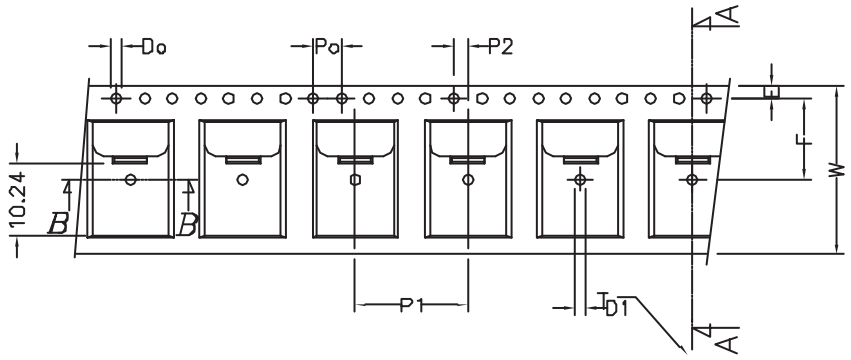


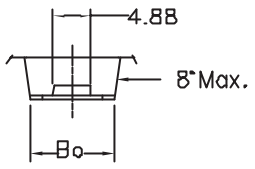
DIMENSIONS

REF.	MILLIMETERS	
	MIN	MAX
A	4.40	4.80
b	0.66	0.91
L4	0.00	0.30
C	0.36	0.50
L3	1.50 REF.	
L1	2.29	2.79
E	9.80	10.4
c2	1.25	1.45
L2	1.27 REF.	
D	8.60	9.00
e	1.70 REF.	
L	14.6	15.8
θ	0°	8°

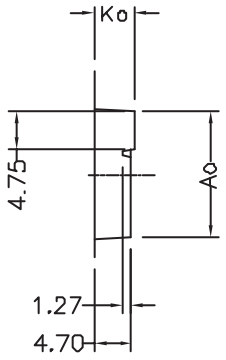
TO-263 Tape Data

TO-263 Carrier Tape





B–B SECTION



A–A SECTION

unit:mm

symbol	A0	B0	K0	P0	P1	P2	T	E	F	D0	D1	W	10P0
Spec	10.80 ±0.10	16.13 ±0.10	5.21 ±0.10	4.00 ±0.10	16.0 ±0.10	2.00 ±0.10	0.356 ±0.13	1.75 ±0.10	11.50 ±0.10	1.55 ±0.05	1.50 ±0.25	24.0 +0.3 - 0.1	40.0 ±0.20