RoHS Compliant
HALOGEN-FREE

MagnaChip

MDE9754

Dual Enhancement N-P Channel Trench MOSFET

General Description

The MDE9754 uses advanced MagnaChip's trench MOSFET Technology to provide high performance in on-state resistance, switching performance and reliability.

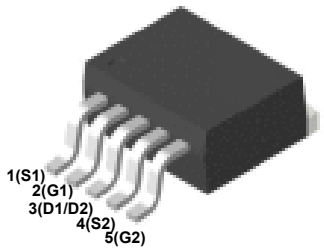
Low $R_{DS(ON)}$, low gate charge can be offering superior benefit in the application.

Features

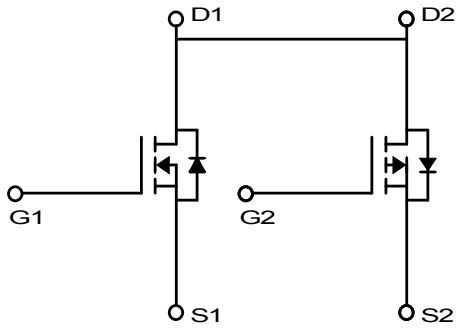
N-Channel	P-Channel
V_{DS} = 40V	V_{DS} = -40V
I_D = 23A @ V_{GS} = 10V	I_D = -24.6A@ V_{GS} = -10V
$R_{DS(ON)}$	$R_{DS(ON)}$
<27mΩ @ V_{GS} = 10V	<43mΩ @ V_{GS} = -10V
<35mΩ @ V_{GS} = 4.5V	<58mΩ @ V_{GS} = -4.5V

Applications

- Inverters
- General purpose applications



D2-PAK-5L



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

Characteristics		Symbol	Rating		Unit
			N-ch	P-ch	
Drain-Source Voltage		V_{DSS}	40	-40	V
Gate-Source Voltage		V_{GSS}	±20	±20	V
Continuous Drain Current (Note 2)	T_C=25°C	I_D	23	-24.6	A
	T_C=100°C		14.5	-15.6	A
Pulsed Drain Current		I_{DM}	50	-50	A
Power Dissipation for Single Operation	T_C=25°C	P_D	20.8	41.7	W
	T_C=100°C		8.3	16.7	
Junction and Storage Temperature Range		T_J, T_{stg}	-55~+150		°C

Thermal Characteristics

Characteristics		Device	Symbol	Rating	Unit
Thermal Resistance, Junction-to-Ambient	(Note 1)	N-ch	$R_{\theta JA}$	40	°C/W
Thermal Resistance, Junction-to-Case		N-ch	$R_{\theta JC}$	6	
Thermal Resistance, Junction-to-Ambient	(Note 1)	P-ch	$R_{\theta JA}$	40	
Thermal Resistance, Junction-to-Case		P-ch	$R_{\theta JC}$	3	

Ordering Information

Part Number	Temp. Range	Package	Packing	RoHS Status
MDE9754RH	-55~150°C	TO-263-5	Tape & Reel	Halogen Free

N-channel Electrical Characteristics (T_J =25°C unless otherwise noted)

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	I_D = 250μA, V_{GS} = 0V	40	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	1.0	1.8	3.0	
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 32V, V_{GS} = 0V	-	-	1	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ±20V, V_{DS} = 0V	-	-	±0.1	
Drain-Source ON Resistance	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 8A	-	20	27	mΩ
		V_{GS} = 4.5V, I_D = 6A	-	26	35	
Forward Transconductance	g_{FS}	V_{DS} = 10V, I_D = 8A		20	-	S
Dynamic Characteristics						
Total Gate Charge	Q_g	V_{DS} = 28V, I_D = 8A, V_{GS} = 10V		9.2		nC
Gate-Source Charge	Q_{gs}			1.7		
Gate-Drain Charge	Q_{gd}			2.2		
Input Capacitance	C_{iss}	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz		440		pF
Reverse Transfer Capacitance	C_{rss}			38		
Output Capacitance	C_{oss}			76		
Turn-On Delay Time	$t_{d(on)}$	V_{GS} = 10V ,V_{DD} = 20V, I_D = 1A, R_{GEN} = 3.3Ω		5.9		ns
Turn-On Rise Time	t_r			17.3		
Turn-Off Delay Time	$t_{d(off)}$			16.5		
Turn-Off Fall Time	t_f			10.7		
Drain-Source Body Diode Characteristics						
Source-Drain Diode Forward Voltage	V_{SD}	I_S = 8A, V_{GS} = 0V		-	1.2	V

P-channel Electrical Characteristics (T_J =25°C unless otherwise noted)

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	I_D = -250μA, V_{GS} = 0V	-40	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = -250μA	-1	-2.0	-3	
Drain Cut-Off Current	I_{DSS}	V_{DS} = -32V, V_{GS} = 0V	-	-	-1	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ±20V, V_{DS} = 0V	-	-	±0.1	
Drain-Source ON Resistance	$R_{DS(ON)}$	V_{GS} = -10V, I_D = -6A	-	32	43	mΩ
		V_{GS} = -4.5V, I_D = -4.0A	-	43	58	
Forward Transconductance	g_{FS}	V_{DS} = -10V, I_D = -6A	-	12	-	S
Dynamic Characteristics						
Total Gate Charge	Q_g	V_{DS} = -28V, I_D = -6A, V_{GS} = -10V		19.2		nC
Gate-Source Charge	Q_{gs}			3.1		
Gate-Drain Charge	Q_{gd}			4.4		
Input Capacitance	C_{iss}	V_{DS} = -25V, V_{GS} = 0V, f = 1.0MHz		868		pF
Reverse Transfer Capacitance	C_{rss}			72		
Output Capacitance	C_{oss}			125		
Turn-On Delay Time	$t_{d(on)}$	V_{GS} = -10V ,V_{DS} = -20V, I_D = 1A, R_{GEN} = 3.3Ω		11.0		ns
Turn-On Rise Time	t_r			21.4		
Turn-Off Delay Time	$t_{d(off)}$			32.5		
Turn-Off Fall Time	t_f			15.0		
Drain-Source Body Diode Characteristics						
Source-Drain Diode Forward Voltage	V_{SD}	I_S = -6A, V_{GS} = 0V		-	1.2	V

Notes :

1. Surface mounted FR4 board with 2oz. Copper.
2. P_D is based on $T_{J(MAX)}$=150°C
   P_D (T_C=25°C) is based on $R_{\theta JC}$,

N-Channel

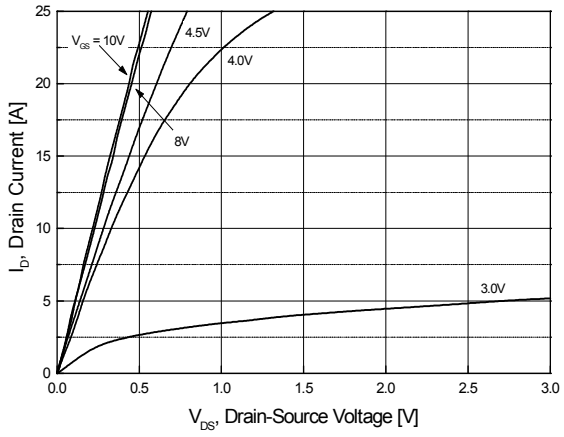


Fig.1 On-Region Characteristics

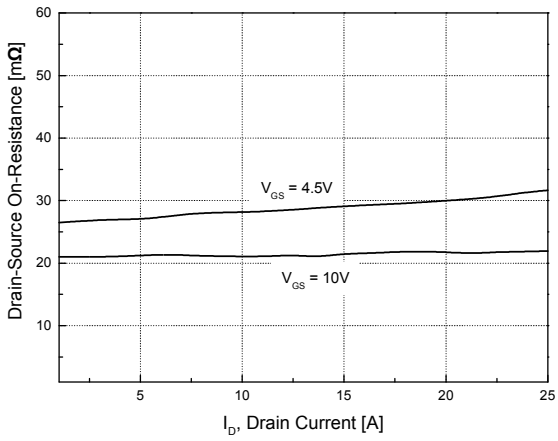


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

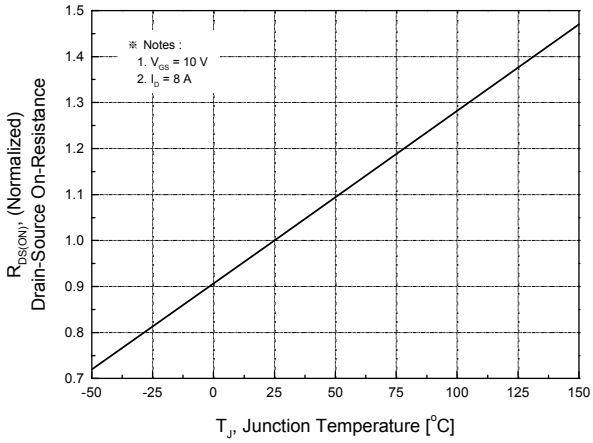


Fig.3 On-Resistance Variation with

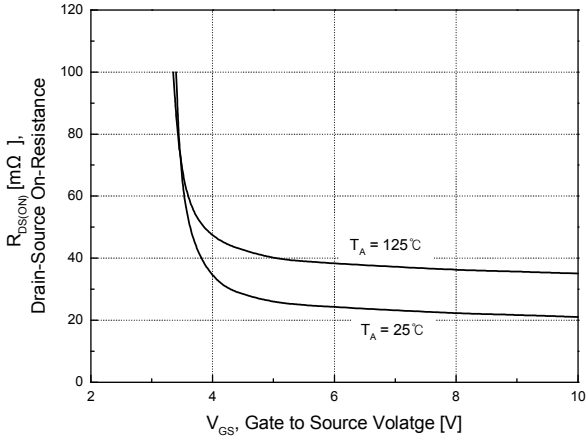


Fig.4 On-Resistance Variation with Gate to Source Voltage

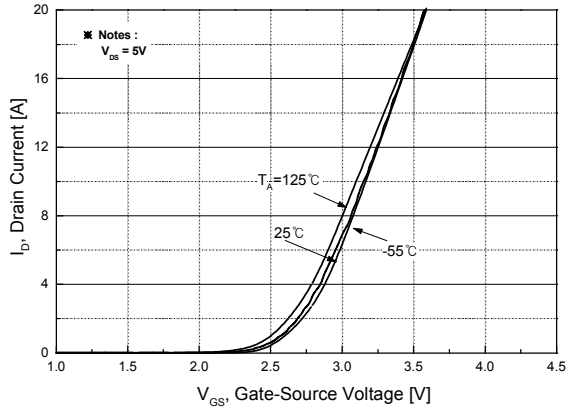


Fig.5 Transfer Characteristics

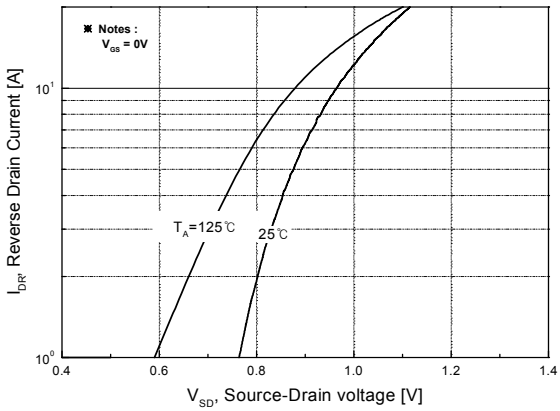


Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature

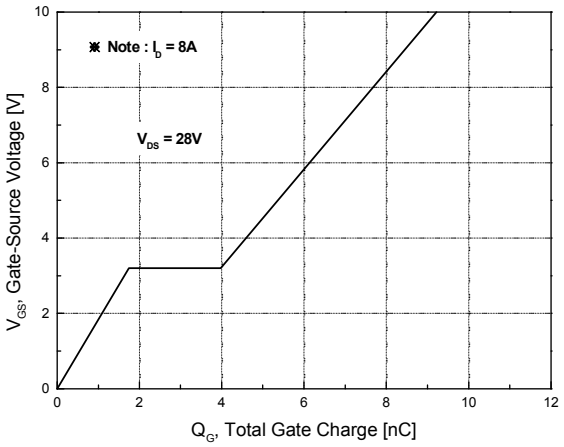


Fig.7 Gate Charge Characteristics

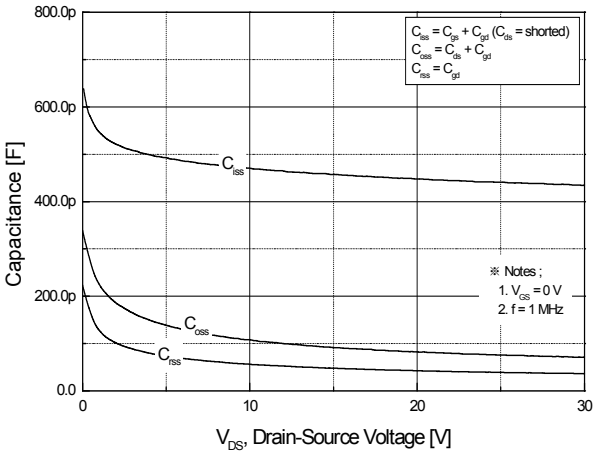


Fig.8 Capacitance Characteristics

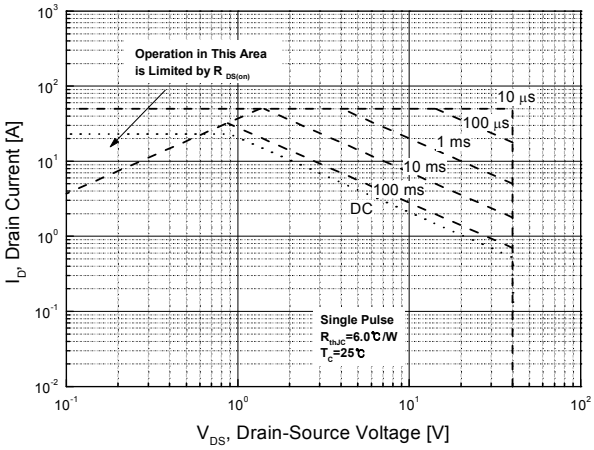


Fig.9 Maximum Safe Operating Area

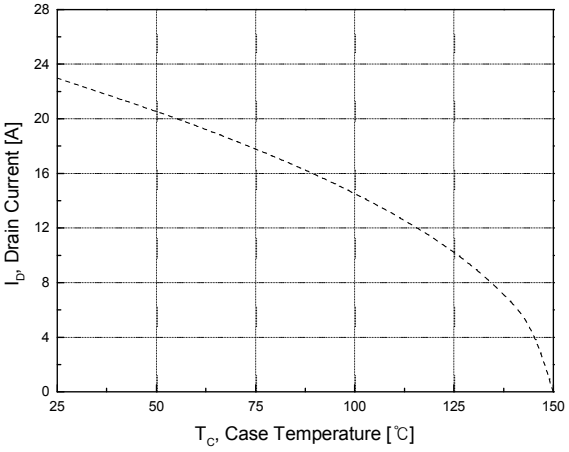


Fig.10 Maximum Drain Current vs. Case Temperature

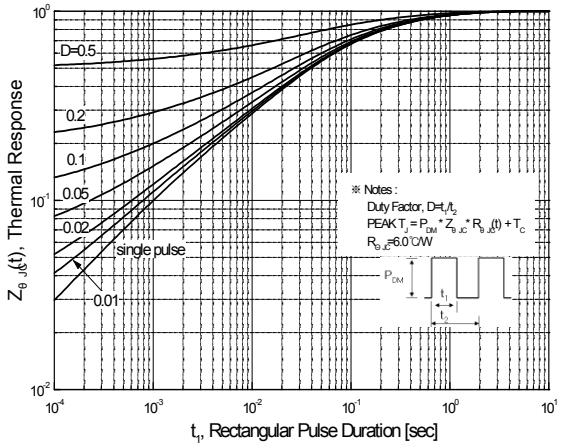


Fig.11 Transient Thermal Response Curve

P-Channel

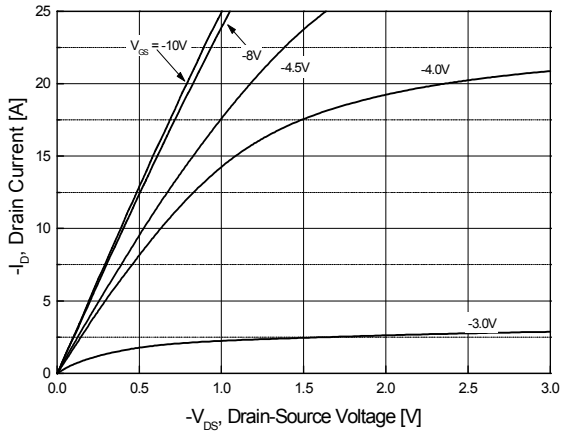


Fig.1 On-Region Characteristics

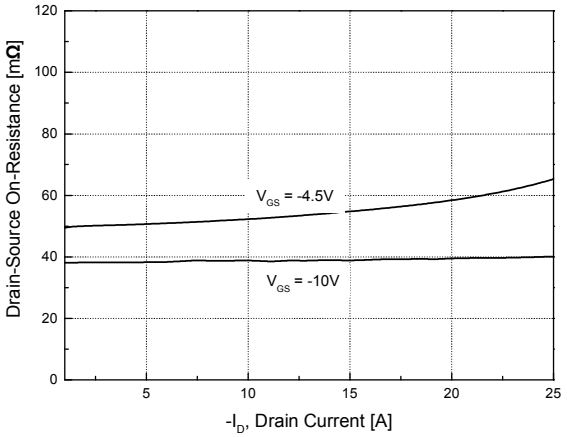


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

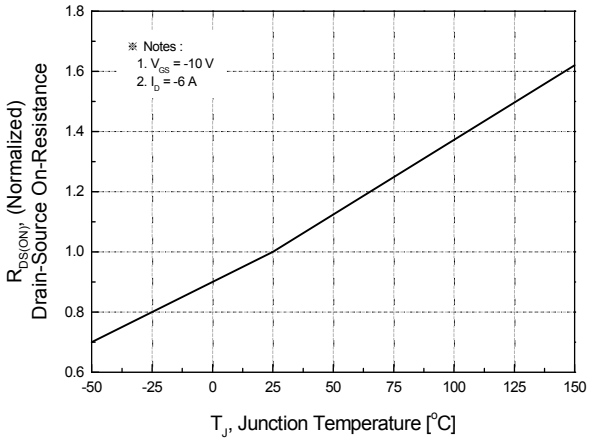


Fig.3 On-Resistance Variation with Temperature

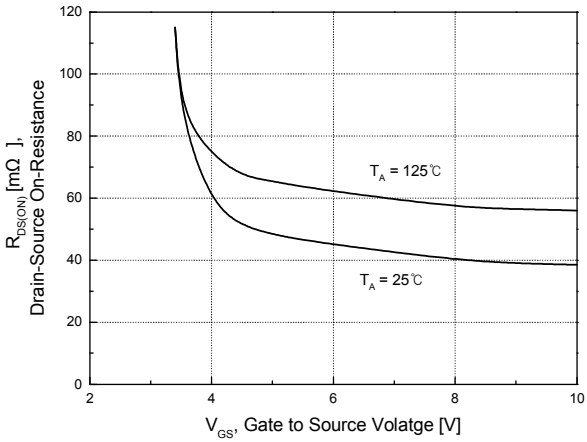


Fig.4 On-Resistance Variation with Gate to Source Voltage

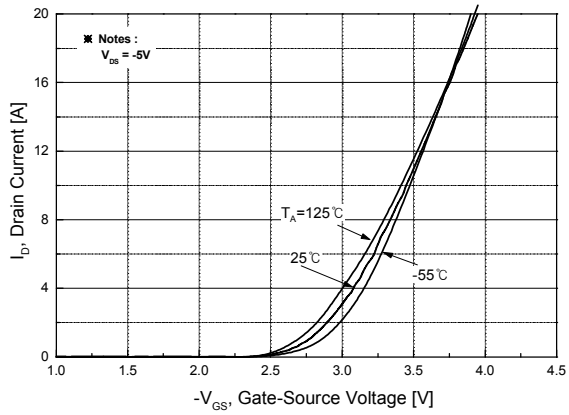


Fig.5 Transfer Characteristics

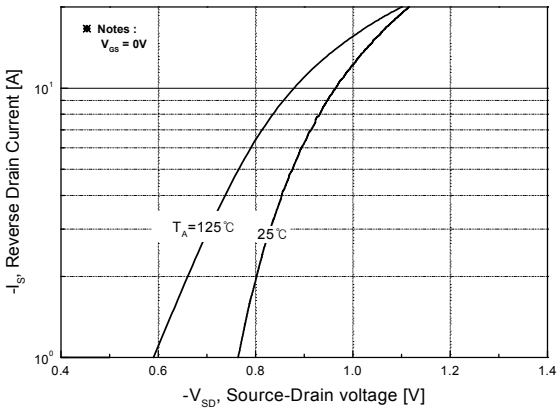


Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature

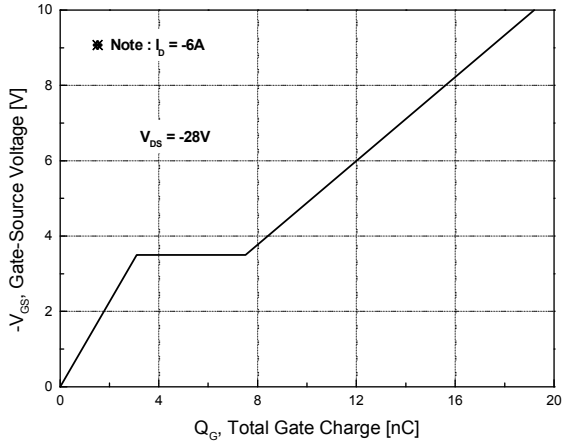


Fig.7 Gate Charge Characteristics

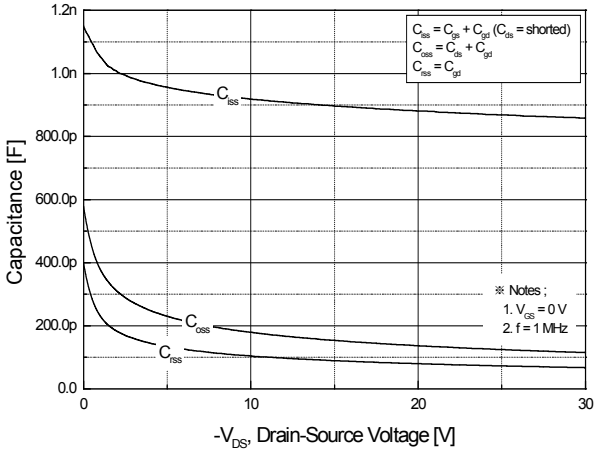


Fig.8 Capacitance Characteristics

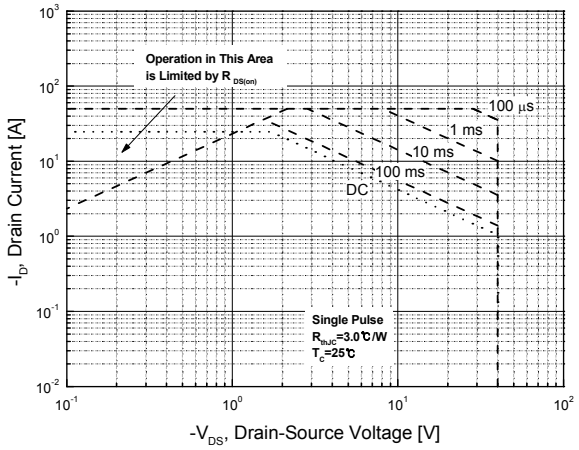


Fig.9 Maximum Safe Operating Area

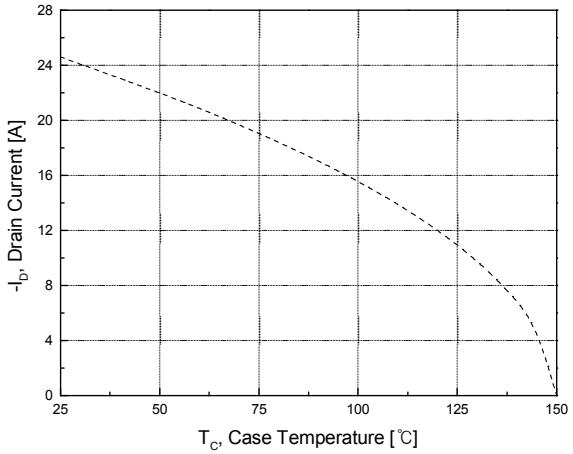


Fig.10 Maximum Drain Current vs. Case Temperature

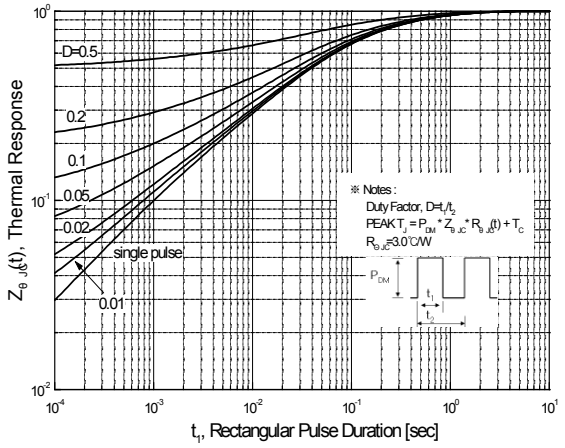
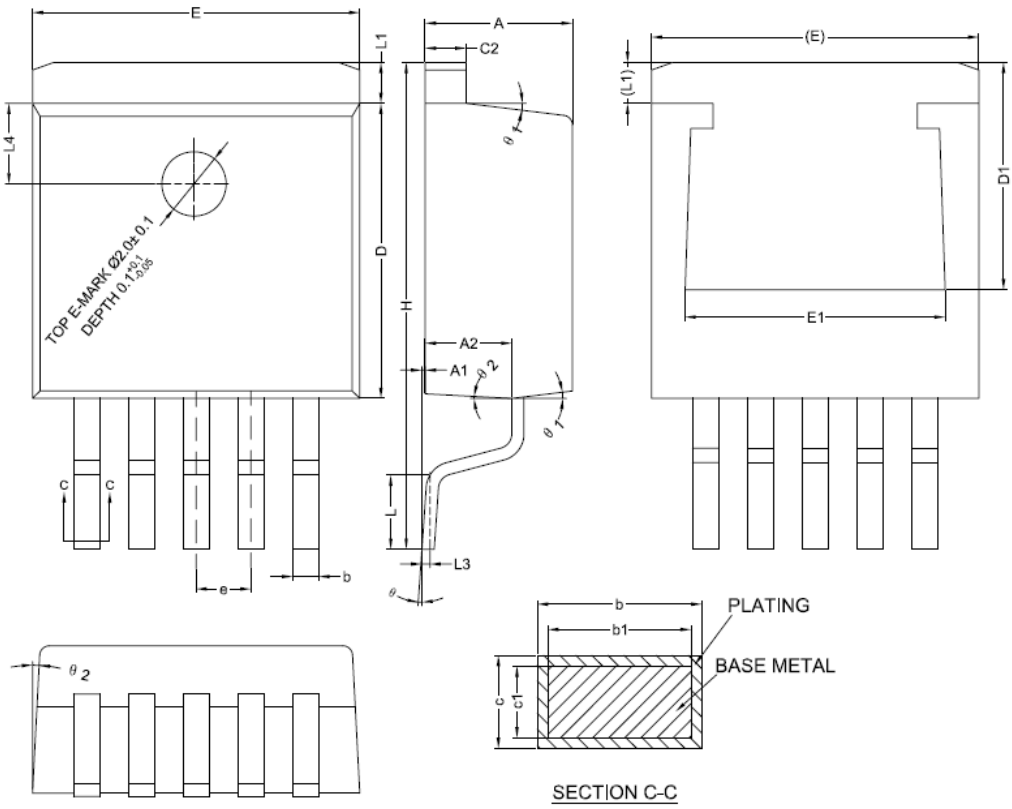


Fig.11 Transient Thermal Response Curve

Physical Dimensions

D2PAK(TO263), 5 Leads

Dimensions are in millimeters, unless otherwise specified



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	4.40	4.57	4.70
A1	0	0.10	0.25
A2	2.59	2.69	2.79
b	0.77	-	0.90
b1	0.76	0.81	0.86
c	0.34	-	0.47
c1	0.33	0.38	0.43
c2	1.22	-	1.32
D	9.05	9.15	9.25
D1	6.86	-	7.50
E	10.06	10.16	10.26
E1	7.50	-	8.30
e		1.70BSC	
H	14.70	15.10	15.50
L	2.00	2.30	2.60
L1	1.17	1.27	1.40
L3		0.25BSC	
L4		2.00REF	
θ	0°	-	8°
θ 1	5°	7°	9°
θ 2	1°	3°	5°

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